JULY

THE RAILROAD & CURRENT MECHANICS

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THE MIND OVER MATTER

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See Page 249

Skin Energy

The skin is an important contributor to the sum of human energy. So long as it is kept fresh, pure and healthy, it is an inspiriting and an invigorating influence; and the best known means of keeping it in that condition is to use

Pears' Soap

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OF ALL SCENTED SOAPS PEARS' OTTO OF ROSE IS THE BEST.

FC

Does This Picture Fit Your Case?

Why Not Be the Traffic Manager Instead of the Railroad Clerk?

The picture on the left is that of the average $20 a week railroad clerk—the one on the right is that of a Traffic Manager, who makes $5,000 a year and upward.

A FEW weeks ago one of our department managers was traveling on the same train with a gentleman connected with the North Western Railway Company. In casual conversation in the smoking car these two men gradually drifted into the subject of Interstate Commerce Commission rulings and the new freight rate laws. They finally reached the subject of competency of men in the railroad service to handle the new freight rate situation.

The big railroad man did not know who our department manager was, but our man knew him, for he had seen his railroad pass while the conductor was recording it. Our man asked him point blank what he thought of the Interstate Commerce Course being offered by the LaSalle Extension University, having previously explained to him the nature of the course.

His reply was that "such a course, if properly constructed and carefully administered, should enable any one to accomplish more in a few months than could be accomplished in a lifetime at a desk in a railroad office." When he was asked to explain his reason for his opinion, he said:

"Well, of course, I am an old railroad man and I learned what I know from actual experience, but I am fair enough to admit that a thorough course of training in the right school will give one a general knowledge of freight rates and traffic subjects, whereas in railroad service each man has certain limited duties to perform each day, AND IF THOSE DUTIES BE PERFORMED WELL (with a significant wink) *ONE MAY HAVE A LIFETIME JOB AT THE SAME DESK.*"

Ah! There's the situation for you. At an unguarded moment this big railroad man *let the cat out of the bag*, because you, and everyone else who knows anything about the monthly wage earner, know that the big railroads have thousands of men who are entirely satisfactory at *one particular desk, doing one particular thing*, and that these thousands of men remain at the same desks all their lives.

WHY? This is easily answered: ***Because they are only prepared to do one kind of work; because they are not familiar with the work just a step or so above them; because they have remained contented with their store of knowledge and have not tried to find out anything about the work the men above them are doing.***

Through our course in Interstate Commerce we teach you how to find out about the work the man higher up is doing. We teach you all about the new freight laws that have caused so many changes in the old way of figuring rate combinations.

If you do not wish to follow railroad work, the big steel plants, the big coal companies, the big lumber companies, and the hundreds of other big industrial corporations offer big opportunities to men who can save them money in the shipment of their respective commodities. A Traffic Manager's salary is not an expense to a firm, but, to the contrary, it is a profitable investment, because he may save the firm ten times his salary each year. This kind of position enables a good man to command his own salary. Any one with ordinary education and ability may successfully complete the course. Not even a high school education is essential.

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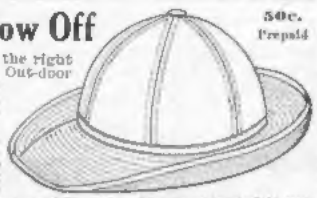

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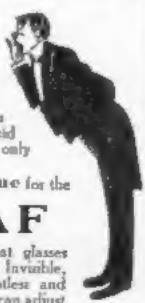

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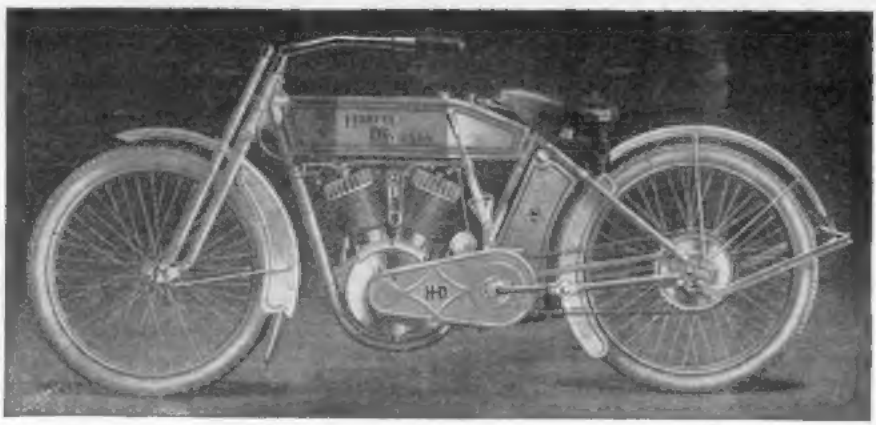

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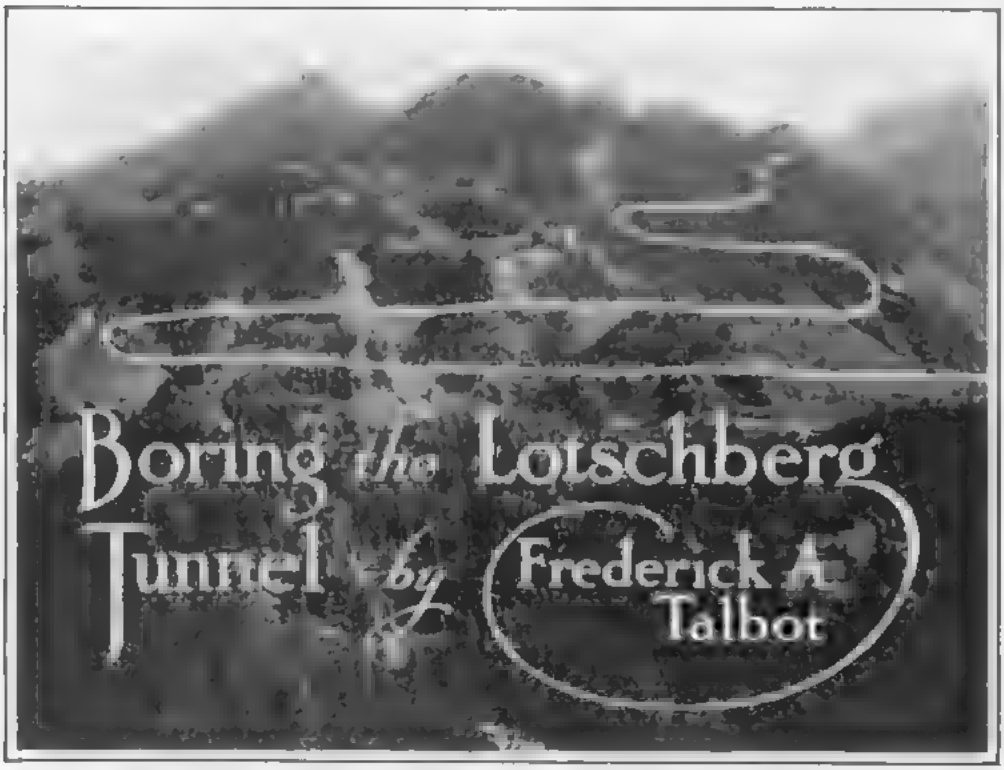


THE WHITE LINE INDICATES THE ROUTE OF THE LOTSCHBERG RAILWAY. THE SPACE BETWEEN THE ARROWS SHOWS WHERE THE TUNNEL PIERCES THE MOUNTAIN

It Took 3,500 Men Over Seven Years to Bore a Nine-Mile Hole Through the Bernese Alps, Switzerland, at a Cost of $1,650,000 a Mile.

SWITZERLAND may be a small country—so small that it may be tucked comfortably three times in New York State, but it is a land of marvels of railway engineering that are without a parallel in any other country between the two poles.

You can be whisked through the air to the dizzy crests of mountains and whirled through long subterranean bur-

rows, from six to nine miles in length, driven through the bases of snow and ice-crowned teeth of rock forming the Alpine chain. The mountain railways command attention because they lift the traveler into scenes of surpassing beauty; the tunnels because they are audacious examples of engineering genius.

When the Swiss had once demonstrated their prowess as tunnel borers by the success of the famous St. Gotthard undertaking, which, although it experienced remarkable vicissitudes, yet was completed successfully, their ambitions recognized no limitations.

Overcoming the First Difficulties.

When Nature molded Europe she grew tired evidently when she reached Switzerland, and left her work badly finished. The natives considered this no particular handicap in the progressive march of civilization until the steam locomotive came along, and then the country chafed at the shortcomings of Nature

Theirs was a buffer country. Railways could expand on all sides of her tolerably, easily and cheaply — but those mountains!

Engineers were prepared to cut through them, but financiers shook their heads and held on tightly to their purses. Burrowing through mountain knots might be glorious from the engineering point of view, but would they stand the searching test of commercial exploitation? The financiers thought not.

Yet something had to be done. Switzerland was suffering economically. Traffic was being diverted from her lands and towns, and France had joined with Italy by piercing the Col de Fréjus with the wonderful Mont Cenis tunnel

What France could do was equally feasible to the Swiss, so the mighty Gotthard was tackled and conquered. A new highroad of steel from the North Sea to the smiling shores of the Mediterranean was opened, and the Swiss received the due reward of their enterprise because all the through traffic of importance between busy northwestern Europe and the south flowed through the country of the cantons.

One brilliant success acted as a pick-me-up. In time we had the Simplon and another artery of traffic was created. The Gotthard did not suffer from its rival because the latter developed quite a new river of commerce.

Then came the project for boring the Lotschberg, and financiers paused once more

To find the exact location of the Lotschberg tunnel turn to a map of Switzerland and look for a large lake called Lac Leman. It is in the southwestern part of Switzerland and can be found without difficulty. From Lac Leman proceed directly northeastward until you reach a smaller body of water called the Thuner See. On the southern shores of the Thuner See is Spiez. Almost directly south you will find Frutigen, from which the new Lotschberg line starts. About the same distance southward is Kandersteg. At a point a very short distance to the southwest is Clus, and it is at this point that the tunnel enters the mountains and pierces its way southward to Goppenstein, approximately 9.32 miles away.

The project was so startling that they could not refrain from hesitating; it was pardonable from every point of view.

The fathers of the scheme intended to bore a tunnel for no less than 9¼ miles through the Bernese Alps, and what was more, had decided to work it by electricity, notwithstanding the fact that the possibilities of this motive power for trunk road workings still remained to be proved.

As a matter of fact the Lotschberg tunnel was no new project. It had been suggested before the Gotthard, but the early youth of railway engineering stood up against it.

Finding the Money.

When the Gotthard idea came up the Lotschberg enthusiasts fought it tooth and nail, in favor of their own scheme, but were worsted in the encounter. Berne was nettled at this rebuff, and although the canton supported the Gotthard idea, it resolved to nurse its own scheme and to push it forward when the opportunity came.

The Alpine Railway tunnel laid dormant for nearly fifty years, and then came to life with more pronounced vigor than ever. Its opponents voted against the scheme vigorously.

The opposing influences pleaded that the people could not bear the financial burden involving millions, and which indeed represented the largest sum ever submitted to the public in the history of the country.

The projectors put the cost of construction down at some $7,000,000 and

When the project was thoroughly under way a revision was deemed urgent The original undertaking provided for only a single track both for tunnel and approaches

The Gotthard had outgrown the capacity of a single road and heavy expense had been incurred in widening. Why

A 2,000 HORSE POWER ELECTRIC LOCOMOTIVE OF THIS TYPE WILL PULL TRAINS THROUGH THE LOTSCHBERG TUNNEL THEY ARE THE MOST POWERFUL ELECTRIC LOCOMOTIVES IN EUROPE AND WERE BUILT IN SWITZERLAND

the canton of Berne was to bear about half the outlay.

The completion of the Simplon tunnel made Berne more determined than ever in regard to its old idea, and when rival projects were put forward they were brushed aside with scant ceremony

It was to be the Lotschberg or nothing. After a spirited fight the canton won.

It was a terrific undertaking from the commercial and engineering points of view. The sum of $16,600,000 was set aside for the work, of which $15,000,000 was to be devoted to the building of the railway, its equipment, and all other necessaries. Half of this sum was to be devoted to the tunnel itself, and the balance to the approaches and rolling stock

not provide for futurity in the Lotschberg by double tracking at the start? It was decided and another $5,000,000 was added to the first estimate

The project was not so hare-brained as it seemed. The new line was to thread one of the richest districts in the country—the Bernese Oberland—where the tourist traffic is tremendous during the season. At Interlaken tourists occupy on an average of 450,000 beds during the period of five months in the year

But most important, the tunnel would provide a shorter cut between Italy, Germany, and France. From four to seven hours in traveling were to be saved in the through journey representing about 105 miles. Berne was to be brought 62

miles nearer Basel; and other points were to benefit appreciably.

The tariffs for traveling were to be reduced between fifty cents and five dollars, and freight rates were to be pulled down just as strikingly, according to distance, as compared with rival routes.

The tunnel was the greatest feature of the undertaking. The surveys were run, and the geological borings were made. Both showed that the underta king would present no greater difficulties than had to be overcome in building the Gotthard and the Simplon, if they would prove as momentous.

Of course, extreme heat and subterranean springs were to be expected, as the heart of the mountain knot was approached, but the surveyors and geologists reckoned that once the borers drove into the calcareous formation they would plow their way for the rest of the distance through solid rock.

The total length of the line was placed at 48.8 miles, of which 9 32 miles were to be represented by the great tunnel.

The chain to be penetrated was scarred with a deep gulch at one point, known as the Gasteren Valley. This was the only weak point; but the surveyors who alined the tunnel concluded that the borers would clear the floor of this depression safely

Italian Laborers Employed.

Once the money was forthcoming no time was lost in making the rock fly. The tunnel was to be driven north and south simultaneously. Kandersteg was selected as the encampment at the north ern end, and Goppenstein was used for the southern headquarters

As tunnel borers the Swiss are not very proficient. To bring the enterprise to fruition, Italians were necessary. These laborers revel in such work and appear to be built by nature for pegging away at hard rock in a temperature of nearly 100 degrees, and in a darkness that can be felt and which is relieved only by lurid flares, while the inhalation of vitiated atmosphere laden with rock dust and fumes appears to exert no ill effects upon their respiratory organs.

The prospect confronting the contractors was about as uninviting as could be conceived. The approaches were through some of the most rugged country to be found in Switzerland.

Instead of driving a "tote" road through the country to the sites for the portals, they laid down a construction railway. This in itself was almost as trying as the building of the actual road. There were deep gulleys which had to be spanned by timber trestles, and projecting humps had to be pierced by small tunnels.

Where the mountain flanks dropped sharply into ravines, a narrow pathway had to be cut out of the face of the rock to take the construction road.

At one point a lofty timber viaduct in the form of a loop had to be erected for the conveyance of the excavated debris and to bring up supplies.

At one point on the Goppenstein side there was a ticklish corner. A mountain torrent cascaded down a rift, the side of which sheered down at nearly 80 degrees, with a surface as void of vegetation and ledges as a timber slide.

A gang of men, by a circuitous route, gained the top of this cliff. Ropes were lowered a few feet. Here they plugged at the rock, driving deep holes in which were jammed heavy beams on which a single plank walk was laid for the graders.

In order to get to this perilous perch from the trail below, an ingenious, albeit primitive, system had to be devised.

A hauling appliance was placed in a shack above the gangway, and a plank—in the four corners of which holes had been bored to admit ropes knotted underneath—was lowered over the rocky hump.

The workmen stood on this cradle and were hauled over the obstruction to the gangway, steadying themselves as best they could in their ascent.

Although the construction engineers went to much trouble and expense building this primitive track to bring up supplies, it did not cope with the situation entirely.

Some of the necessary material was too large and bulky to be hauled through the small tunnels. Among these were the ventilating blowers which had to be slung on four wheels by means of logs and hauled up over the crooked mountain paths by five or six teams of mules.

Electricity played an important part

in the constructional work. On the north side transmission wires were laid down bringing current from Spiez to Kandersteg at a pressure of 15,000 volts, to be stepped down to 125 volts for lighting, and to 500 volts for power purposes.

Electrically driven compressers had to be set up for ventilating the headings, and also to charge the compressed-air locomotives which hauled the construction trains within the borings.

On the Goppenstein side of the tunnel Loetschen River was tapped to develop a three-phase current at 5,000 volts This was reduced to about 250 volts for general purposes.

By the time work was well in hand, 3,500 men were on the pay-rolls

Percussion drills were largely used. The tunnel has a width of 26¼ feet, and from the rail level to the crown of the arch is 20 feet. The drills were mounted on a carriage having a wheel-base of about six feet, and each boring appliance carried six drills

All were driven by compressed air, although trials were made with two electrically driven drills giving a pressure from 90 to 110 pounds a square inch at the drills. The compressed air-drills, however, were the more successful

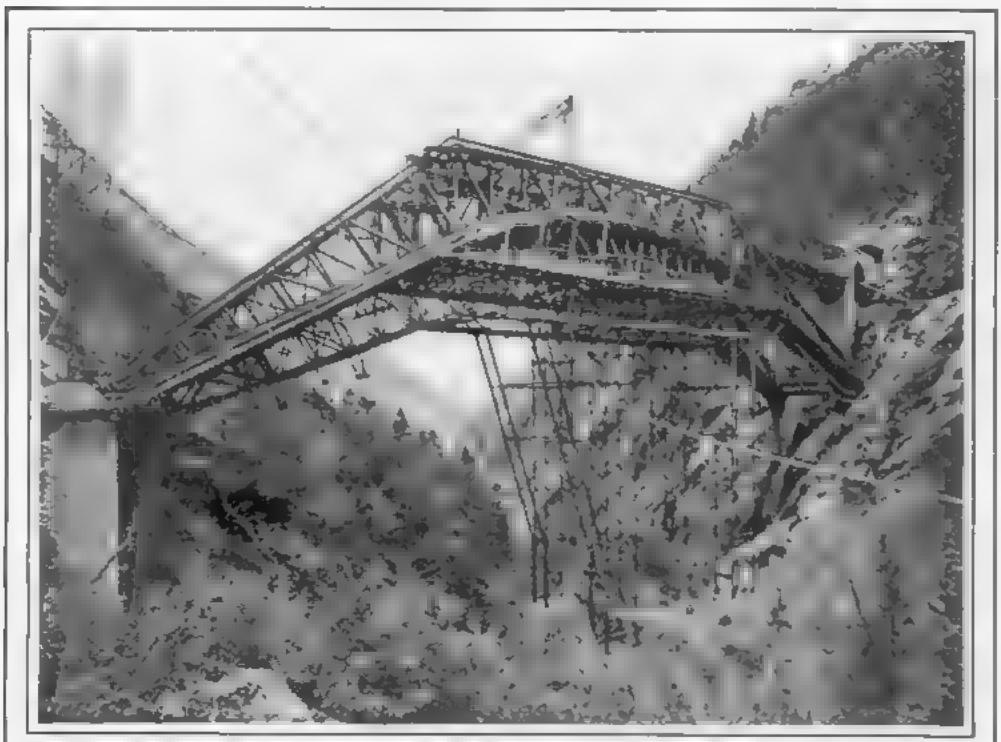
The engineers had drawn up a schedule of advance which, from the character of the rock, they concluded would permit of a certain progress each day.

This was laid down as a basis, and the drillers were urged to exceed it if they could

If they were successful they earned a substantial bonus; if not, they earned just their day's wages.

The work was continued both day and night, the men working in eight-hour shifts. Each shift drilled about two rounds and "shot" twice, yielding an average advance of from six to seven feet a shift, or from eighteen to twenty-one feet a day

The method of boring was to drive a heading from six to seven feet high, and



ONE OF THE NATURAL DIFFICULTIES THAT HAD TO BE OVERCOME IN BUILDING A RAILROAD THROUGH THE BERNESE ALPS. THERE ARE THIRTEEN OF THESE VIADUCTS OVER IMPASSABLE CAÑONS. THESE BRIDGES WERE ALL BUILT FROM THE TOP, AS IT WAS FOUND EASIER TO LOWER THE MATERIAL INTO PLACE THAN TO RAISE IT BY HOISTING MACHINERY

THE TWO GANGS OF WORKMEN PIERCING THE TUNNEL MET ON THE MORNING OF MARCH 31, 1911. THE MEN IN THE PICTURE (READING FROM LEFT TO RIGHT) ARE L. WIROT, CONTRACTOR; V. PRUDHOMME, CHIEF OF WORKS; M. MOREAU (EMERGING FROM HOLE), CHIEF ENGINEER ON SOUTH SIDE; F. ROTHPLETZ, CHIEF ENGINEER ON NORTH SIDE; PHIL ZURCHER, MANAGER OF CONTRACTING COMPANY

Drawn from a photograph taken by artificial light five miles from the open air

about seven feet in width. At intervals of 600 feet or so, a shaft was driven upward to the full height of the tunnel, and from this upper level other headings were driven to widen the tunnel out to its full area.

As the two gangs were working simultaneously at different levels, precautions had to be taken to protect the men working below from the débris dislodged above. For this purpose heavy timbering was required. This precaution prevented the line along which the ballast trains ran from being stalled by blocks of falling stone.

The work was exciting and dramatic. Time was the vital consideration. The heat was suffocating, although every known device was liberally used to secure the comfort of the rock borers, who clung tenaciously to their drills, anxious to earn a premium on their day's work.

The men were bare to the waist, and the brilliant white glare from the acetylene lamps made them look like ghosts. It is surprising that electric hand lamps were not used, but the contractors anticipated frequent breakdowns from short circuits and damage to the flexible leads. Accordingly each man was provided with an acetylene-gas lamp.

The illumination was perfect; so long as the men were simply drilling all worked satisfactorily. The huge cumbersome drilling machine was brought up to the solid face and the "*r-r-r-r-r*" of the drills as they bit into the hard rock, drowned the gurgling of the subterranean springs which were tapped every little while.

The rock hogs looked more like fiends than human beings. They waded up to their knees in murky slime and water, inhaling noxious gases, and wet with perspiration, as they struggled in the stifling heat of the mountain's vitals.

When the drills got home to a depth of about four feet, showing twelve holes standing out grim and gaunt in the rock face, the drill-carriage was wheeled back. The explosive charges were tamped home, a huge iron shield was brought up, and the charges were fired.

For a few seconds not a sound was heard, except the bubbling of the water coming from the mountain depths. Then there was a dull grinding, muffled roar as the pent-up gases of the explosive

wrenched tons of rock from the mountain's heart

The blast of the gases swept down the narrow passage, extinguishing all the acetylene lamps carried by the borers, nearly sweeping the men off their feet, while the air within the confined space smelled strongly of black powder.

The workers and their plant were wrapped in Cimmerian darkness. Matches flickered as the lamps were relighted, and through the haze could be seen the murky forms of the Italians rushing over the débris to plow once more into the rock.

Above the heads of the borers towered a solid mass of rock to a height of several thousand feet. With each blast huge lumps of rock tumbled from the uneven ceiling above, and the feeling of insecurity after the acetylene lamps had been extinguished by the blast was nerve-racking.

But the Italians merely laughed at the situation and their jeers were mockingly reechoed down the depths of the burrow. The Italian revels in the resistance of the work and laughs as the earth tumbles after the splitting explosion.

It was a grim fight with death for every foot, and death stalked freely among those who risked their lives. Death won out once or twice and had a good harvest.

When the Roof Fell In.

The biggest from its point of view, and the worst from that of the engineers and the workmen, came on July 24, 1908. The surveyors had been a little apprehensive about the Gasteren Valley. They knew the roof of the tunnel would come perilously near the floor of the depression, but they concluded that there would be plenty of solid rock.

Unfortunately the surveyors were out in their calculations. The night shift was on, and it was 2 30 A.M. by the clock.

The drills had been drawn and the charges of powder rammed home. The fuses were lighted and the workmen drew back as usual, expecting to see the normal amount of rock come down.

The rock did come down—and the floor of the valley as well. The Italian workmen flew in terror, but twenty-five were not quick enough and were overwhelmed. The inrushing mass of soft glacier débris roared along the cavern with fearful speed for a distance of 1,731 yards out of 2,940 yards, which had been driven with such infinite labor, in ten minutes.

When the inundation ceased the tunnel presented a sorry sight. The roof had caved in for a considerable distance after the first breach was made. The engineers called a halt, while the surveyors got busy. The question was, should the old boring be cleared out and some attempt made to shore up the tender part of the tunnel roof? The prospect was alarming as the surveyors ascertained.

Drilled Forty-Two Feet in One Day.

But the project was not to be abandoned. Several million dollars had been expended in driving the heading nearly a third of its distance on the one side, while the borers were making rapid headway on the other.

A new route was suggested, with a boring a few yards to one side of that already made, and driven in such a manner that it would clear the tender spot of the Gasteren Valley, under which it passed.

It meant wasting a vast amount of work and money, but there was no alternative. Moreover, as the original tunnel had been planned in a straight line, the new route introduced a curve, but the bend could be eased so that it would not affect the traffic adversely. This détour increased the length of the tunnel by 880 yards.

On the night of February 29, 1908, a group of Italian workmen and others were at their supper in the hotel at the Goppenstein entrance, when suddenly a terrific roar was heard

The next instant the hotel rocked and swayed as if writhing in an earthquake, and then collapsed like a pack of cards.

It was an avalanche. It bounced down the steep mountain slopes, plumped full against the hotel, killing twelve of the diners, smashing the post-office, police station, and other buildings.

Masses of rock, snow, ice, and trees were piled up in all directions—and the tunnel entrance could not be seen. It was buried beneath the débris.

The dangers of the avalanche had been revealed on a previous occasion, on the Kandersteg side.

The destructive influences of this visitation were then overcome in an ingenious manner. Instead of split fences on the mountain slopes, solid masonry walls parallel with the track have been built up the mountainside

In another instance where the train runs along a mountain edge, the flank above the track has been scooped out to form a large gulley. The avalanches strike the opposite curve of this protection, and are deflected into the air to fall clear of the track.

The most striking feature of this enterprise was the speed with which the drilling was done. The drills on the north side enabled the rock to be broken down with unparalleled rapidity

An advance of thirty-three feet a day was by no means unusual. High water mark was reached with forty-two feet in one day—an achievement which has never been equaled in boring of other Alpine tunnels.

Early in the year 1911, it was felt that the "headings" were approaching very closely, and at 3.50 on the morning of March 31, ringing cheers rolled down each gloomy cavern.

The night-shift had made the final breach, and the opposing crews crawled through the gap to offer congratulations. In the party were the chiefs of the engineering, construction, and financial organizations.

The tedious work of four and one-half years was accomplished! The first attack on the mountain chain was made on October 15, 1906, at Kandersteg, so that the meeting of the headings in March 31, 1911, ranks as a brilliant engineering achievement.

Once the final barrier was broken down, widening proceeded at a rapid rate. The tunnel is of the usual arched form, lined throughout. The center is the summit level of the Spiez-Brigue, or Lotschberg railway, being 400 feet above sea level.

The electrical system is as noteworthy as the tunnel itself. The track is of the standard gage with a maximum gradient of 1 in 37. It is built solidly so as to withstand heavy and fast trunk-road traffic. The single phase alternating current system is adopted with 15,000 volts, 15 cycles on the feed wire.

It was realized that the electrical locomotives would have to be of tremendous power, and in the design of the tractors considerable pioneer work had to be carried out, seeing that at the time no single phase locomotive of more than 1,000 horse-power was in operation.

The Swiss and German works took up the electric traction question and produced the most powerful electric locomotive in Europe. The largest, No. 121, has a draw bar pull of 22,000 pounds, which is the maximum permitted by international agreement. It can haul a train of 310 tons, twenty-six miles an hour on the maximum gradient of 1 in 37. On the Gotthard railway two steam locomotives, weighing together approximately 230 tons, attain a speed of 22 miles an hour on a similar grade. The electric locomotive weighs only 90 tons, and the total output is 2,000 horse-power, the work being carried out by two motors each developing 1,000 horse-power.

The German locomotive, No. 101, has an output of 1,600 horse-power and can handle a load of 260 tons at 22 miles an hour on the maximum grade. In addition to these powerful engines there are three Siemens motor cars each seating sixty-four passengers, fitted with two 225 horse-power motors each and capable of handling a load of 135 tons.

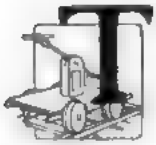
In a distance of 7.8 miles a difference of 1,385 feet in altitude has to be overcome, and this is the steepest section of the line. It is made for the most part on what are known as the Mittholz loops. The plan of the grade here is practically in the form of a figure "8," the line making one loop in the open, while it then crosses to the opposite side of the valley to describe the second loop in a corkscrew tunnel 1,830 yards long

Cheerfulness is fine weather with the line clear and all trains on time. Gloom is fog and muddled schedules.

THE MEN WHO BRING BUSINESS TO THE RAILROADS.

How the General Freight Agents of America Comb the Wide World for Tonnage to Make the Rolling Stock Pay.

BY PEARSON MacINTOSH.



THERE were no freight agents in the early days of railroading. The canals were jealous of the railroads and had them prohibited by law from carrying freight. The struggle between the waterways and the rails did not end until sixty years ago. Shortly after, the general freight agent appeared.

To-day the general freight agent of a big road, he is called the freight traffic manager, is one of the busiest and most important of all railway officials. In many respects he resembles the prime minister of a government. He negotiates treaties and agreements not only with the railroads of his own country, but with those of other countries and with the steamship lines that run to the remotest corners of the globe.

Because the field of the general freight agent is world-wide he requires many lieutenants. Some are in his office at headquarters. They look after the various divisions and subdivisions of traffic. Scattered among the cities of America, at the most advantageous business points, are scores of district freight agents. Then there are the free lances, the skirmishers and the traveling freight agents, who go everywhere seeking tonnage for their line. These men flit back and forth and up and down the continent. Many of them cover fifty thousand miles a year.

FRANK J. WOLFE, G. F. A., LEHIGH VALLEY RAILROAD

Photograph by Marceau, New York.

In the great trade centers of the world there are still other representatives

H. E. PIERPONT, F. T. M. CHICAGO MILWAUKEE AND ST. PAUL RAILWAY

Photograph by Matzene, Chicago

of the general freight agent's office. They are the trade scouts—foreign consuls of the railroad empire. You will find them in every port from which freight is likely to be shipped.

No other industry in the world has its system of business-getting more minutely and methodically organized than a railroad. The bigger the line, the farther it goes afield. Therefore, the general freight agent must be an unusually capable executive.

He is not and cannot be a complete compendium of all knowledge relating to transportation, but his years of training and his wide experience have given him a marvelous facility in getting through his tremendous task with seeming ease.

He could not tell you, off-hand, the through rate on lumber from Saginaw to Singapore, but he knows the men in his office who have that information at their finger tips.

But the general freight agent has many other things to do beside keeping his business routine running smoothly and effectively.

He must have a prophet's vision for the things that may affect the freight business of his road for good or ill.

He must see the possibilities of new traffic and grasp them before his competitors.

He must know where his machine is weakening and repair it before it breaks down.

He must have a mathematician's grasp of figures to understand all the bewildering complexities of freight rates and divisions, so that no other line's freight representative may catch him napping when traffic agreements are being discussed.

He must always keep his temper unruffled and continually be making new friendships and cementing old ones, all for the good of the road.

One would think that a general freight agent would have little or no time for sleep. On the contrary, the general freight agent who is the biggest and the busiest appears to have lots of leisure.

It is knowing that his orders are carried out properly that indicates his executive ability.

Whenever the late E. H. Harriman was making an inspection tour of his vast holdings it was his custom to spend several days at every point where the general offices were located.

First he would have his meetings with the principal executive heads, then he would start out and ramble through the offices. He would stroll from one department to another alone, stopping here and there for a moment's chat with one minor official after another, even picking up a paper from a clerk's desk and asking questions about it.

Overburdened with Detail.

Harriman never made any comments at the time, but later when talking with his chief aides he would discuss the various matters that had come to his notice.

One day he walked unannounced into the office of the general freight agent of one of his Western roads. The official had been away several days and his desk was piled high with correspondence. He was in his shirt-sleeves and was dictating letters at a tremendous rate when Mr. Harriman entered.

Harriman shook hands with him, but only stayed long enough to observe that the G. F. A. was pretty busy

That evening Mr. Harriman and Mr Kruttschnitt were talking together There had been a period of silence, and Mr. Harriman said:

"I was in the general freight agent's office to-day. His desk was covered with correspondence. He was dictating letters that should have been answered days ago. He had been away

"Now, I don't like that. I can get a lot of people to dictate letters. I want men who aren't slaves to routine. When I walk into a man's office and find him with a clean desk, leaning back in his chair doing nothing, it pleases me

"That kind of a man has time to originate good ideas. I like to see a man in the position of G. F. A. thinking, thinking, thinking. I want less letter writing and more thinking all along the line."

As a rule the big traffic men of to-day are nearer Mr. Harriman's ideal than those of yesterday. The average G. F. A. may not dictate a dozen letters a day. The time he spends in his office will be devoted largely to seeing people and originating new plans for getting and handling business.

A Question of Speed, To-Day.

Much of a railroad's reputation rests on the quickness with which it handles its tonnage. It is not entirely a question of speed of trains between two points. It is in getting perishable stuff —especially food for the city —to the proper point in the yards at the proper minute, so that the men and teams waiting may load up in the least possible time. A problem that general freight agents are studying now as they never studied before, is getting freight of all kinds into the hands of consignees with the utmost speed. This comes under the general head of "preventing delays at terminals." It is one of the great problems of distribution.

There would be little use trying to describe a general freight agent's day in detail, because the details never are the same. No day is typical

In his comparatively leisure moments, the G. F. A. runs rapidly through the

J. B. BAIRD, G. F. A., NORTHERN PACIFIC RAILWAY.

Photograph by Moffett, Chicago

pages of some of the principal trade journals, but he gets a better idea of the future course of the commodities which his road carries by talking direct with those who produce or deal in them.

The G. F. A. is always asking questions in a quiet, diplomatic way. He is always an interested listener when he meets any one who can give him information, for it is very necessary that he should secure a lot of first hand news about everything connected with sources of existing traffic, also traffic that can be developed. He measures up all this with his own experience and knowledge, makes his plans and issues his orders accordingly.

There are a lot of men growing up in the freight department who are like a certain man, now a vice-president in charge of traffic on a great railway system

Years and years ago this man was an unimportant, unconsidered division freight agent on a branch line. His headquarters were in a little town. His predecessors hadn't secured sufficient business in the territory to pay their

M. G. STEPHEN, G. F. A. CANADIAN NORTHERN RAILWAY

salaries. It was a strongly competitive district and the road that this man represented was handicapped in every way. But some one had to be kept on the ground, hopeless as the situation was.

The new division freight agent soon found that it would take but little of his time to keep the volume of business up to the standard set by his predecessors. He made a few quiet inquiries as to how they had put in their spare hours. He learned that one drove a team of fast trotters, and another had exhibited much talent as a poker player. These accomplishments had not increased traffic.

The new man took a new tack. In those days singing societies were at the height of their popularity. A wave of vocal music seemed to be sweeping over America. The new division freight agent had an exceptionally fine tenor voice. He liked to sing. He joined about every choir and singing society in his district and took a keen delight in them, and made a host of warm friends. He combined music and freight routings.

It was not long before the G. F. A. and others up at headquarters began to notice that the tonnage of the despised division was increasing. They sought an explanation and found that the vocal wonders of their division freight agent was luring traffic to their rails.

That was twenty-five years ago; but that freight agent is still remembered by elderly folk in the division where he sang so well. He is still with the same road, now a mighty system, and he now draws something like $25,000 a year salary.

The general freight agent of a trunk line that ends at the seaboard has two chief aides about whom the public knows little, yet each has a highly specialized and important position. One is in direct command of the freight terminals and the other of the freight that is exported to foreign lands.

In New York City the terminal freight agent and the foreign freight agent have reached their highest development. The total value of the merchandise imported into the United States last year was nearly $1,700,000,000. Of this nearly $1,000,000,000 entered the port of New York. The value of the merchandise exported was more than $2,200,000,000, of which $820,000,000 passed through New York.

Handling New York's Tonnage.

Galveston ranks second to New York City in the value of exports —$218,000,000. Then New Orleans and Savannah.

To handle New York's vast volume of tonnage—the greatest of any port in the world — the railroads that terminate at New York harbor have established huge terminals. Each line has from ten to twenty-five freight stations where this commerce is received and despatched every day. The New York Central and the Pennsylvania each delivers about a thousand carloads of freight a day to three score piers along some sixty miles of water front.

The terminal freight agent's time is devoted to taking care of this business expeditiously. He is not required to be a "tonnage builder." His duties are almost entirely executive.

In his department there are many subdivisions for the commodities handled

in bulk. Each is in charge of a freight agent.

Coal is one of the biggest items. There are huge coal pockets and storage sheds, and acres of tracks crowded daily with incoming coal cars loaded to the brim. New York City requires an enormous quantity of coal. The distribution to the points where it is needed must be regular—and it must never halt.

It is the same way with the food supply, which is another branch of the terminal freight agent's department. In food as well as fuel New York City lives largely from day to day. Its needs are so stupendous that it is difficult to overcome this condition. No matter what storms lash the waters about New York City or how thickly it is blanketed in fog, the train loads of food and fuel *must* be delivered on time.

The freight agent in charge of the grain department is also a busy man—exceptionally so when the exports of his commodity are at flood tide. New York City exports almost as much grain as all the other ports of the United States combined. Then come the tens of thousands of tons of heavy iron and steel products that are shipped abroad. Then the vast tonnage of manufactured merchandise of all sorts from factories all over America.

Part of this is consumed by or distributed through New York City, the rest is loaded on steamers for transportation across the seas.

How the Foreign Agent Helps.

The foreign freight agent works hand in hand with the terminal freight agent. It would be hard for either of them to tell exactly the line that divides their duties.

For instance, a manufacturer of wheelbarrows in Ohio wishes to ship several consignments to customers in various parts of the world. All will be ready to leave the factory at the same time. One carload goes to London, England; a less than carload to Oran, Algeria, and two carloads to Manila.

In each case he has sold them c. i. f. (cost, insurance and freight paid). As

A. S. LEAROYD, G. F. A. DELAWARE, LACKAWANNA AND WESTERN RAILROAD

Photograph by Brown Brothers, New York

I. H. HUBBEL, G. F. A., NEW YORK CENTRAL LINES

Photograph by Sarony, New York

GEORGE D. OGDEN, G. F. A., PENNSYLVANIA RAILROAD

he does not care to wait for his money until the goods are landed at the various ports and remittance made, he desires to make sight drafts through his bankers against the bills of lading. In this way he will receive about 90 per cent of the value of his shipments immediately in cash.

Before he cabled the quoted prices to his customers, he asked the freight agent in his town to secure ocean rates from the foreign freight agents in New York City. With this information in hand, the wheelbarrow manufacturer was able to answer his cables in less than twenty-four hours after he had received them. If it had not been for the facilities offered by the railroad, the manufacturer would have been put to much expense and considerable loss of time by telegraphing to a number of steamship agents, or he would have had to employ a representative in New York City to look after such business for him. To be of service in such matters, however, is one of the things for which the railroad maintains its foreign freight department.

When the shipment of wheelbarrows is ready to move the manufacturer again seeks the local freight agent. The latter once more telegraphs the foreign freight agent, giving the necessary details, and asking him to give the sailing dates of steamers for London, Oran, and Manila, and to get the best freight rates possible, without commitment, for the railroad's customer.

It may be that the ocean rates, in one case or another, are higher than the shipper thinks they should be, or that they have advanced since the manufacturer sold his goods. Then the shipper, through his local freight agent, sends another telegram to New York.

The foreign freight agent is instructed to make a "firm offer" of the rate that the shipper is willing to pay. Freight steamers, especially the deep-sea "tramps" that have no regular run, have no fixed tariff for carrying goods. The rate fluctuates according to the amount of freight in sight and the condition of competition. It is a matter of bargaining.

The foreign freight agent's office, therefore, makes a canvass of the steamers running to the port in question. They name various rates, but none is satisfactory. The foreign freight man, acting as conscientiously and shrewdly as if the matter were his own personal affair, offers the freight rate authorized by the shipper.

Acts as a Broker.

If it is accepted the matter is then practically closed and the local freight agent out in Ohio is telegraphed the result so that he may inform the shipper. In the case of a consignment taking considerable space, the foreign freight man will reserve sufficient room.

On receipt of this information the shipper closes a contract with the local freight agent of the railroad for each shipment, through to its ultimate destination. The foreign freight agent is then advised by telegraph and the engagement made with the steamer is ratified.

In handling this transaction the foreign freight agent has acted only as the broker or representative of the shipper. Before the railroad receives the freight and its own responsibility begins, the shipper and the ocean carrier are bound

by the contract that has been executed. Any failure to deliver the shipment at the proper time to the railroad company at the point of origin of the shipment involves the shipper in any claim for loss the vessel may sustain.

When the shipments are loaded on freight cars, the bills of lading are issued. These, as well as the export waybills, bear the number of the contract that has been made through the foreign freight agent.

Bills of Lading Are Drafts.

These bills of lading are of the same relative value as bankers' drafts or bills of exchange. They are issued in sets of two or three, as the shipper may desire. On each bill of a set the number of bills issued and affirmed must be written. The agent also has to issue another copy for use of the ship, and still another for the foreign agent.

Each is stamped with a description of the purpose for which it is intended, and bears the words "Not Negotiable." At destination the property is delivered on presentation of one copy of the bill of lading, properly endorsed. Any one of the two or three bills of lading issued may be used for this purpose. When delivery has been made the other bills of lading become void

The bills of lading for this export shipment of wheelbarrows, like all similar documents, show all the transportation charges from the town in Ohio to London, Oran, or Manila, as the case may be. The shipper may prepay these charges, but this is not usual, except in the case of perishable freight or merchandise of small value.

The steamship company pays the railroad the amount of the inland charges. Thus the shipper in Ohio may make draft on his customers on the other side of the world for the full amount of his invoices, less the freight charges and insurance which are to be collected on delivery at destination.

In all this transaction, thus far, the foreign freight agent has been the only railroad official at the New York end who has taken an active part, but when the wheelbarrows reach New York the terminal freight agent and the foreign freight agent must lend a hand.

Bound for three different destinations the wheelbarrows have to be delivered to three different points along the water front. The shipment for London may go by one of the big freight lines that ply from docks along the North River. The one for Oran probably would be taken over to South Brooklyn, to go into the hold of some deep-sea tramp loading for the Far East, that will touch at the Algerian port. The two car loads for Manila would be landed at another pier on the Brooklyn side, the Erie Basin, where all manner of queer sea cattle are tethered waiting for burdens

When delivery has been made the terminal freight agent is notified of it by the marine department—the division of the operating department that has control of the movements of the floating equipment. The terminal freight agent then notifies the foreign freight agent, who wires the local freight agent in Ohio

The latter tells the shipper that his goods have been embarked, the shipper notifies his bankers who have made advances against the bills of lading, and the transaction that has brought such a large portion of the complicated railroad machinery into play, is closed.

Railroads Seeking Business.

This detailed shipment is but one of thousands that take place every day through the foreign freight agents' offices of the large trunk lines. There are some forty different lines of steamers between New York and European ports, more than a score run regularly to the ports of the West Indies and South America, and there are at least a dozen lines that link New York by sea with South Africa, China and Japan, and Australia and New Zealand.

In addition to these established lines there is a fleet of tramp steamers, ranging from two thousand to twenty thousand tons burden, that will steam for any port to which they can get enough freight

There was a time when a railroad never thought of seeking business. It was content with that which presented itself at its door. To-day, however, the railroad, more than any other industry, is making every possible effort to increase its tonnage.

WILLIAM BRADY, M.D.

STRONG MEN WITH WEAK BACKS.

BY WILLIAM BRADY, M.D.

The First of a Series of Heart-to-Heart Talks to Railroad Workers, Trainmen, and Mechanics on Certain Ailments That Are Not Quite so Serious as They Seem.

EVERY little while a man hops off his train, visits my office on his way home, and remarks something like this:

"Doctor, I guess there's something the matter with my kidneys. Wish you'd fix me up something to take."

He edges carefully, rigidly back into a chair. From the general outlook it would appear that he must have dislocated a kidney or something, the way he holds himself

"What's the matter?" I begin asininely. Then I wish I had opened the cross-examination in another way, but it is too late. He grins and fires back that little retort which first took the wind out of Hippocrates's sails some centuries ago.

"That's what I came in to find out!"

"Well, you just said you guessed it was your kidneys, didn't you?" I parry, trying to recover my composure. "Now that the joke is on me, I'm willing to risk another question or two. Why do you suspect your kidneys?"

"Why, because my back is so lame. Right there," he indicates with one hand, tenderly. "Gets me when I stoop over or try to lift anything. I thought my back would break in two when I started to get out of bed this morning. It was just like a spike was being driven in—right here."

"Did it come on rather suddenly?" I inquire cautiously, thumping his back.

"Gee, I guess yes! I was jacking up a car, and something snapped in there—felt as though I'd torn lose a kidney, that's about the way of it."

Well, after a little preliminary bunco, such as every patient expects, I ask the complainant to undress and permit me to look him over.

As the examination proceeds I learn gradually that there have been no other particular symptoms of kidney trouble either lately or remotely. Of course, in order to satisfy the victim's fears, it is usually necessary to demonstrate by actual chemical tests that the kidneys are as sound as ever.

As a matter of fact, it is only the rare exception for actual kidney disease to express itself in backache or pain about the loins. Kidney stone and kidney abscess do cause excruciating pain as a rule, but Bright's disease, acute or chronic, is rarely accompanied by any special complaint about the back.

Another reason for acquitting the kidneys of causing backache is that, whereas the majority of backaches affect the small of the back or an area lower down, the kidneys are situated well above the small of the back, up under the lower ribs. So when the average patient places his hand over the lame spot, he is usually indicating a section about a foot below the situation of his kidneys.

To continue with my conductor, I fuss around, looking for signs of various conditions which might produce pain in the

back. Among them are overloaded bowel, gastric ulcer, varicocele, piles, flat feet, inflammation of the lumbar muscles or nerves, and finally strain or sprain of the pelvic joints.

This latter condition is surprisingly common in railroad men. Whether the continual jar of riding has anything to do with it I do not know, but the occasional strain of heavy lifting, especially in a stooping posture, undoubtedly predisposes to partial dislocation or relaxation of these important joints.

The base of the spine (the sacrum) is a wedge-shaped bone resting between the wings of the hip bones. It has been called the "keystone of the pelvic arch." Upon it falls the entire weight of the body, and through the joints this weight must be conveyed to the legs.

Effect of Strain on the Back.

Since the joint surfaces are on a slant which is not quite perpendicular to the direction of the lines of force when a weight is lifted by the body, it is easily seen how great the strain on the ligaments and muscles around the pelvic joints must be

Women suffer even more frequently than men from sprains and relaxations of the pelvic joints, owing to their natural tendency to relaxation at times. But the condition probably accounts for the majority of supposed "kidney trouble," "lumbago" and "sciatica" cases in railroad workers, trainmen, and mechanics.

It does not always develop suddenly, though the worst cases usually come on while some severe effort is being made, as in lifting a heavy rail or jacking up a car. In one who has been recently confined to bed by prolonged illness, the joints are relaxed and hence more liable to strain.

The symptoms are backache or pain in the back, which is altered, at least, by changes of posture. Turning in bed may produce atrocious pain. Leaning down to lace the shoes may give the sufferer a "crick in the back." Standing perfectly erect, or sitting erect with a pillow pressing against the small of the back, often gives considerable relief

The pain frequently follows the course of the great sciatic nerve down the leg on the side affected, the nerve being pressed upon by the partially dislocated bone as it passes in front of the joint. In the past all such cases were called sciatica, and only in recent years has the true cause been identified. By no means are all cases of sciatica thus produced.

Proper Position When Sleeping.

Sometimes the pain follows the course of the lumbar nerves around the waist and into the lower part of the abdomen. Again it may focus itself about one hip.

On examination the physician finds special tenderness on pressure immediately over the affected joint. Furthermore he can elicit sharp pain in the joint by manipulating the wings of the hip bones while the patient lies on one or the other side.

So positive is the evidence in this manner obtained, that the physician is easily able to detect the faker who occasionally cooks up a complaint of weak back in order to stick around home during an important series of ball games.

In the way of prevention, it is a good plan to see that the mattress one sleeps on does not sag at the middle. A firm, hard mattress is a protection to a weak back.

It is unnatural to lie flat on the back when sleeping. Such a posture keeps the muscles of the back more or less at work all night, and they need relaxation like all other muscles during sleep.

A properly applied belt is a great aid for those whose work throws much strain upon the back. This belt must be at least three inches wide, of leather, snugly applied well down over the hips, "ginny-fashion," not around the small of the waist. A pointer in this direction may be obtained by observing the belts worn by Italian laborers in the ditch; they don't wear belts to hold up their trousers or their stomachs, but to support their backs.

Faulty Chairs Responsible.

For the relief of pelvic strain a plaster girdle or strapping applied by the doctor meets the indications in moderate cases. Sometimes a firmer support may be required, and plaster-of-Paris girdles are put on for this purpose.

If the joint is badly sprained, or partially dislocated, it becomes necessary to place the patient under an anesthetic and reduce the dislocation by forcible manipulations, then apply a rigid girdle of plaster-of-Paris. The severest cases of "sciatica" and "lumbago" may be at once cured in this manner.

Slouchy habits of posture in sitting and standing predispose to relaxation of the pelvic joints. Chairs are often constructed on such a plan as to encourage this mal position or even enforce it on the occupant.

The average chair arches backward at the very point where it should arch forward to support the small of the back. Rockers are particularly bad in this respect. The "sleepy hollow" chair is an excellently designed chair for the production of backache. So is the rigid-backed seat in the day-coach.

I don't know whether railroad men everywhere assume the same posture in standing, but a lot of them seem inordinately proud of their paunches. Not that they have anything specially to be proud of under their belts, but they stick them out as though to put their best part forward.

Hold in your stomach and your chin, and throw out your chest as if you owned a tie or two yourself, and your back will give you little trouble

MUST HAVE BASEBALL NEWS.

DURING the playing (baseball) season the Associated Press is carrying over its forty thousand miles of leased wires full box-scores of every game in the National and American Leagues to approximately two hundred and fifty morning papers! And that's not the end. In addition to the major league box-scores, there are the minor league and college games to be reported. Thus, on a wire running from New York City to Albany, for instance, there are sent every playing night during the season eight major league box-scores, four boxes of the New York State League, and the results of the International League and the American Association. Southern circuits must carry Southern League box-scores and those of the major leagues; the Middle West has the American Association and the major-league box-scores; and so on.

It takes a good operator just seven minutes to copy a box-score; hence, with sixteen major-league teams playing, this means eight games, or fifty-six minutes of wire time taken up every night during the season with the big-league box-scores alone. On circuits where there are minor-league box-scores to be sent, it means double that time, or nearly two hours.

In fifty six minutes nearly three thousand words of "straight" news matter can be transmitted over a wire, and it's a mighty good story that gets that much space in the average American newspaper. On the night of the Triangle Waist Company fire in New York, in which one hundred and forty-six lives were lost, the Associated Press handled a story of nearly four thousand words, but it was cleared on the wires from coast to coast in about half the time that is required for box-scores on the New York-Albany wire every night when the games are in swing.—*Outlook*.

TRESPASSING A MISDEMEANOR.

GEORGE T. REID, assistant to the president of the Northern Pacific Railroad, has announced that after June 1, all persons not in the employ of the railroad who are found trespassing on the road's double-track right of way in Washington will be placed under arrest, in accordance with the law passed by the legislature at its last session. The law makes it a misdemeanor to go on any part of a right-of-way in the State on which is operated more than one main line.

The horror of the railroad man who must see his engine bear down on a person walking on the track, although he is powerless to save him, is given as the real reason for the law, which was introduced by Senator Wilburn Fairchild, a former Northern Pacific conductor

"Railroad men are human and they dislike very much being in any way responsible for the killing of these track walkers," Mr. Reid said recently. "One of our engineers killed five men in one week on the double track line between Tacoma and Seattle. No wonder a man like this, who is compelled to see the engine bear down upon some poor fellow, and yet is unable to do anything, should desire a law that would tend to prevent such accidents."

DEAN OF TELEGRAPHERS IS 83 YEARS OLD.

James Henry Wilhelm Tells of the Time When a Brass Pounder Took a Percentage of the Receipts for Pay.

J. H. WILHELM is acknowledged to be the oldest railroad telegrapher in the world, a distinction he has justly earned. Besides being an octogenarian he has served as the general paymaster of the Lehigh Valley Railroad for more than forty years and is well known to the employees and officials for his fair and fearless dealings.

J. H. WILHELM.
THE OLDEST TELEGRAPHER IN SERVICE OVER FORTY YEARS
Photograph by Rinker's Studio, E. Mauch Chunk, Pa.

Mr. Wilhelm was born at Nazareth, Pennsylvania, in March, 1830. His ancestors were pioneer German and Huguenot settlers in the colony of Pennsylvania. Mr. Wilhelm learned the trade of a tailor in a Moravian institution. This trade he followed while learning telegraphy.

"In the year of 1848," said Mr. Wilhelm in telling his story, "the telegraph lines between Philadelphia and Wilkesbarre, Pennsylvania, was built by Dr. Goell, of Philadelphia. An office was opened at Nazareth, and, in 1855, I was appointed operator there, getting a percentage of the receipts for my services. There were no salaries in those days.

"Only a few messages a day passed over the wires. I kept my instrument in my tailor-shop. Sound reading had not then come into vogue, and the characters were impressed upon a reel of paper. The dots and dashes formed the letters by indentations on the paper made by an armature which responded to the movement of the key by the operator.

In 1859 I was transferred to Easton, Pennsylvania, in charge of the entire lines, at a salary of fifty dollars a month. In 1860 I resigned that position to take charge of the telegraph lines of the Lehigh Valley Railroad at Mauch Chunk, which, at that time, extended from Mauch Chunk to Easton, a distance of forty-six miles. As there was not much business over the wire, I occasionally found time to play a game of checkers over the line with distant offices. In addition to other duties, I assisted in paying the men in the employ of the company, making monthly trips between Mauch Chunk and Easton to pay off those who could not be reached from the main offices. I carried the necessary funds in a satchel, traveling on freight trains, passenger trains, and sometimes on a handcar. The monthly payroll only amounted to a few thousand dollars. In the late sixties I was appointed general paymaster and furnished with a private car."

From the rear-end of this car Mr. Wilhelm handed the employees of the Lehigh Valley Railroad their wages for more than a generation, covering the main line between New York and Buffalo, together with branches of the road. He also paid the employees of the Lehigh Valley Coal Company and the Morris Canal, extending from Phillipsburg, New Jersey, to Jersey City, New Jersey. In July, 1901, having been in service for more than forty years, Mr. Wilhelm retired.

Mr. Wilhelm was one of a committee of three that organized the Lehigh Valley Relief Fund, of which he was the treasurer for many years. He also served as president of the Linderman National Bank of Mauch Chunk, and holds a similar position with the J. H. Wilhelm Building and Loan Association. He is one of the most interesting of the railroad pioneers, and says, with much emphasis, that the young man's chances for success to-day are greater than in the primitive times. "It's *not* what you do—it's *how* you do it," is Mr. Wilhelm's slogan.

SOME ACROBATIC WRECKS.

BY PETER SLADE.

WRECKAGE CARRIED OVER NINE HUNDRED FEET ON A LOCOMOTIVE'S PILOT AFTER THE BOILER-HEAD HAD BEEN BATTERED IN

IT is not often that three engines come together in a crash, and we doubt if many of the readers of this magazine know of a record where four hogs — two double-headers piled up in a head-on. The "triple-head" collision shown in the photograph at the top of this page occurred during a severe snow-storm one day last winter, on the Grand Trunk, when a double headed freight running west from Fort Erie ran into a stock-train of forty-six cars bound from Chicago to Buffalo. The stock-train was making only fifteen miles an hour at the time, but the terrible momentum of so heavy a train caused a fearful impact

This was one of the most remarkable railroad wrecks that ever occurred. The first hog of the double-header piled directly on top of its mate, a powerful mogul. It balanced in this position for a while, then turned turtle, and its steam-dome dug a hole in the ground almost four feet square by four feet deep, carrying away the entire cab of the larger engine. Both engines of the double-header were reduced to scrap, but the single engine pulling the stock-train sustained only a damaged pilot and boilerhead and did not leave the rails. No one was injured.

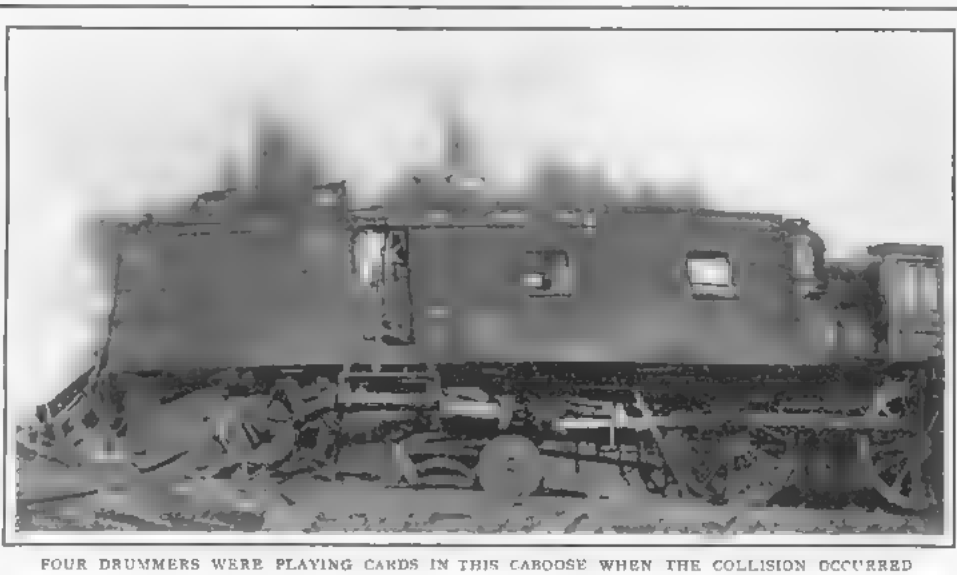
Four drummers were seated in a Wabash caboose attached to a northbound train running into Macon, Missouri. The freight was on the main line and the drummers were lost to the world in a little game of "five-cent ante." A passenger-train, headed the same way, came around a curve, and the engine "walked" into the caboose just

AN UNUSUAL COLLISION IN WHICH THREE LOCOMOTIVES TOOK PART

as a jack-pot was being opened. Though they knew the crash was coming, they waited to see who won the pot. This was decided just as the engine struck. Fortunately the four drummers made for the forward door and escaped with their lives. The engine set fire to the caboose and the fire department was called out.

A peculiar wreck occurred near Steamboat Rock, Iowa, last March. It was distinctly one of the class that railroad men term a "freak." None of the cars of the two trains, excepting the caboose and two stock-cars, which were completely torn to pieces, left the track. The freight, after crashing through the three cars on the rear of the other train, pushed the wreckage and trucks, as well as the remaining string of cars, some fifteen car lengths before it came to a stop.

One of the stockmen, who was in the caboose of the standing train when it was struck, and who had both his legs badly mangled and broken and his back



FOUR DRUMMERS WERE PLAYING CARDS IN THIS CABOOSE WHEN THE COLLISION OCCURRED THEY DIDN'T QUIT THE GAME UNTIL AFTER THE CRASH AND ESCAPED UNHURT

injured, in some miraculous manner was thrown completely through an opening caused by the crash and landed on one side of the track in the right-of-way. His clothes were almost completely torn off of him. This man was taken to a hospital in Eldora, Iowa, some miles away, and although seriously injured, he said that he was fully conscious of what was happening when he was being hurled from the wreckage and until after he was picked up

SWITCHMAN IS CHIEF EXECUTIVE.

Patrick Leeny, of the Chicago, Milwaukee and St. Paul, Is Elected Mayor of Ottumwa, Iowa, by Twenty-Two Votes.

MAYOR PATRICK LEENY, of Ottumwa, Iowa, is an unique character. Twenty six years ago he jumped a Burlington freight train and "bummed" his way from Fairfield to Ottumwa, Iowa. His first night in the city over which he now reigns as executive officer, was spent in the gas-house. A brick was his pillow. During his two-year term of office Mayor Leeny will try to get even with the brick pillow by altering the franchise of the Ottumwa Gas Company —giving dollar gas to all consumers. Dollar gas was one of the planks in his platform. This slogan, notwithstanding the fact that the man behind it was opposed by both newspapers of the city, and by H. L. Waterman, a candidate who had served in the State Senate and as mayor for a number of years, won out by twenty two votes.

MAYOR LEENY.

Photograph by Pierce, Ottumwa, Iowa

Ottumwa's new mayor was left an orphan when six years old. Shortly after the death of his parents he secured employment as water boy with a section gang on the Chicago, Rock Island and Pacific near Fairfield, Iowa, his native home. Soon after he became a full-edged section-hand, but seven years spent in treading the rough gravel inspired him to become driver of a coal-wagon

A year at this work convinced him that Fairfield did not offer sufficient opportunities for his energies

One night he slipped into what he termed a "side-door sleeper" on the Chicago, Burlington and Quincy, and in two hours he was in the yards at Ottumwa The gas-house was the most convenient abode, and he spent the night there, for he had no money for lodgings.

Mr. Leeny secured employment as a common laborer. On his seventeenth birthday he went to Eldon, the division point of the Rock Island system, where he was employed as a brakeman. He lived in Eldon until eight years ago, when he again returned to Ottumwa and accepted the post of switchman in the Ottumwa Junction yards of the Chicago, Milwaukee and St Paul. He still holds this place

Two years ago Mayor Leeny entered politics, coming out for alderman of the Sixth ward on the Democratic ticket. His railroad friends stood by him to a man, and these original Leeny men, with numerous others, lined up strong for him in the mayoralty campaign He was victorious Mr. Leeny waged a war for dollar gas and equal taxation, and pleaded that the laboring class of this manufacturing city should have a representative in office He was opposed on the ground that he had not sufficient education to cope with the obstacles that city officials met.

"It is true that I have no cap and gown," said Mayor Leeny, "and I do not belong to any Greek-letter fraternity, but I know the needs of the common people, and I intend to give them a square deal in the operation of the city government of Ottumwa"

Ottumwa has a population of 22,012 Four railroad systems pass through the city. Mayor Leeny took office on April 7

HELP FOR MEN WHO HELP THEMSELVES—No. 49.

Thaddeus S. Dayton tells a young man what he must do if he expects to succeed in the busy baggage department of a modern passenger terminal.

The day of the baggage-smasher is no more. In its place is a man who works into a specialized position for which training does not fit him unless he is competent to hold an executive position in other departments.

THADDEUS S. DAYTON.

FOREIGNERS speak of our baggage system as one of America's marvels. They consider it remarkable that they can check their trunks to any point in the United States and receive them at the journey's end.

The baggage department of a railway is just as complex and important as any other part of the big, intricate machine. Every branch of railway work has advanced in efficiency, and the division which takes care of baggage has kept pace with the others. The baggage department is constantly being improved

In a huge passenger terminal, like the new Grand Central in New York City, this is especially exemplified. Here the baggagemen handle almost two million pieces of baggage a year, yet you can check your trunk in about thirty seconds. You step from the ticket window direct to the checking counter, a few feet away. You hand to one of the checkmen the "half card" claim-check that the expressman has given you. He glances at the number, looks at one of the large ruled sheets on the long, high desk back of him, selects a baggage check, punches your ticket and returns with the check.

All this is done so swiftly, yet with such calm haste, that you feel as if you were being deprived of one of the excitements of travel. You have not seen your trunk since it left your home; you know the checkman has not seen it; yet he seems to know that it is in the station, else he would not have given you a check for it.

In all except the biggest and most modern of passenger terminals the passenger must go to the baggage-room, after he has bought his ticket to check his trunk. Checking a trunk under these circumstances requires from five to fifteen minutes. Frequently the traveler must accompany a baggageman and aid in picking out his property.

The most crowded moments that a traveler has are those just before train time. Good-byes are said, business men give final instructions, and so on. The time necessary to check baggage becomes a very serious question to those in a hurry.

Solving a Big Problem.

Railroad men appreciate this, but the problem to be solved was how to place the baggage-room next to the ticket window, so that the passenger could immediately step from one to the other Much floor space is necessary to accommodate hundreds of trunks, and floor space is valuable in a passenger terminal.

In the new Grand Central Terminal the outbound baggage-room where the trunks are received from expressmen is ten minutes' walk from the main concourse and the ticket windows. The

moment a trunk or other piece of baggage is received in this baggage-room the number of the claim check attached to it is written on a printed form on which also is noted the name of the express company making delivery.

A carbon copy of this record is kept in the baggage-room and the original is sent by pneumatic-tubes to the checking counter in the main concourse, almost two city blocks away. It reaches there in about two seconds. Half a dozen checkmen are behind the low counter, which is about ten feet from the nearest ticket window. As fast as the slips of paper with claim check numbers arrive, checkmen pick them up and enter them in their proper place on the ruled sheets.

Each passenger receives instant attention. If the record shows that the trunk has been received in the baggage-room the baggage check is issued with amazing quickness. If a piece of baggage is overweight, the baggage-room reports it and the excess charges are noted immediately on the sheet.

A Subway for Baggage.

A few steps beyond the checking counter are the gates leading to the trains. In the Grand Central, under ordinary circumstances, a man can buy his ticket, check his trunk and board his train in less than five minutes.

If the traveler has no trunk and wishes his valise or suit-case checked, he simply hands it across the checking counter, receives his pasteboard tag and proceeds on his way. Back of the counter and to one side of it is a long steel-lined chute. Down this the handbag slides swiftly to the outbound baggage platform and is on the train almost as quickly as the passenger.

When a trunk is checked, the duplicate check, together with the identifying number on the claim tag is shot from the check counter through a pneumatic-tube to the baggage-room. Baggagemen take the trunk immediately and load it on an electric motor-truck with others for the same train.

It is run onto a big elevator which glides swiftly downward to the lowest level of this station in which all the tracks are below the street surface. This is a "subway" built especially for baggage. If the truck-load of trunks is destined for a through train the elevator that carries it upward halts on the level of the through tracks. If it is for a short distance run, it is rolled off on the local train level. In either case it will be unloading alongside the baggage-car in about five minutes after it started from the main baggage-room.

These electric platform-trucks have replaced the trucks that were once pushed and pulled about so laboriously by hand. The baggageman at the more important railroad stations, instead of toiling slowly along with a few trunks and bags at a time, compelled to call for extra "strong arm men" to help him push when the slightest incline was encountered, is emancipated from such work. Instead of exerting mere physical strength, he sits or stands at the steering-wheel of the power truck piled high with baggage and moves off rapidly with his heavy load.

A movement of his hand guides the vehicle to the door of the baggage-car where the load can be handled most conveniently. These trucks travel from five to ten miles an hour and thread their way through gates and around corners with their tons of trunks. They have revolutionized baggage handling, but they are merely a part of the machinery of the baggage department.

In England, where there is no such thing as a baggage check, they still speak of the "brasses" which they use on American railroads, meaning the baggage checks. As a matter of fact, the brass baggage check is practically a thing of the past in this country. The brass check was found by long experience to be unsanitary. More than once a checkman has had blood-poisoning from infection by the brass checks he had to handle. Their weight also was against them. A single check does not weigh much, but the hundreds of thousands carried to and fro detached from baggage, become an important item.

The check now in use—made of thick, tough cardboard—has been found far better than the brass tag. Every traveler receives a new one, and owing to the system of numbering, they can be traced more easily.

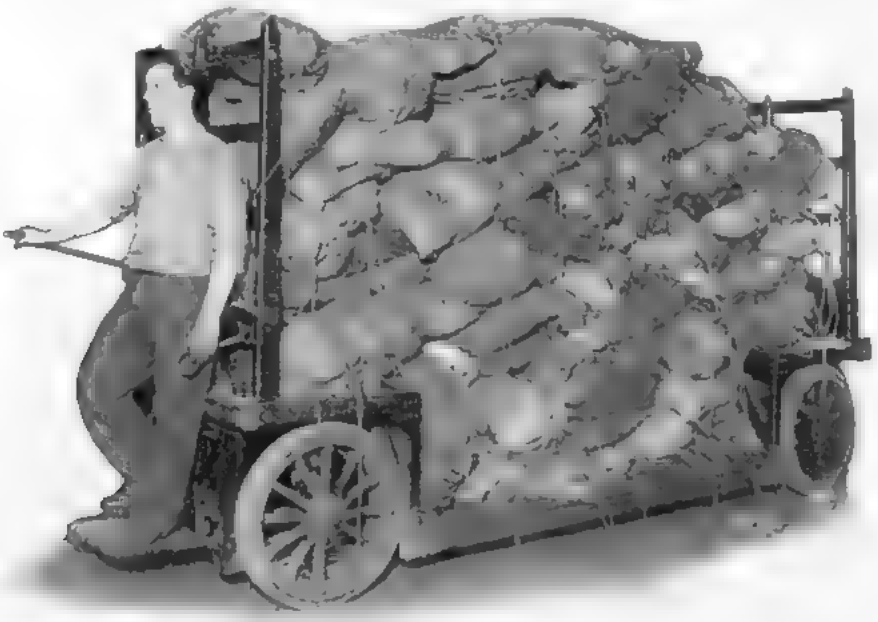
The rule on railroads in the East is to run only one baggage-car in each train.

At certain seasons of the year when the traffic is great, as at the end of vacation periods, special baggage trains are run. A baggage car will hold 200 ordinary trunks and 50 miscellaneous pieces of luggage with room for the baggageman to work. The baggage is not sorted as to its destination before it is trucked to the baggage-car at the passenger terminal.

The train baggagemen accept the trunks as they arrive until the train starts. Then they shift the trunks and other pieces so that the first to go out will be nearest the door. The experienced train baggageman has a carefully developed system and each makes some individual improvement on it to meet the needs of his particular run.

Travel by rail has increased tremendously in the last ten years, but the increase in the number of trunks has not kept pace. General baggage agents say that this is because the public is becoming "travel wise." By that they mean that people have learned that it is not necessary to take several trunks with them when they are going on a trip. In every city where a stop is made one may renew a wardrobe and return the discarded garments by parcel-post or express. Most travelers now take only a suit-case or a valise for a trip of a week or two.

The trunk itself has changed. Middle-aged folk can remember the "Saratoga" that was the source of so many jokes. There is no such thing as a "Saratoga" now. The ordinary tourist trunk is much smaller and better arranged. Railroads carry 150 pounds of baggage free with every first-class ticket. Some wardrobe trunks are so high that they are awkward to handle, yet they weigh when packed less than 150 pounds. A petition is now before the Interstate Commerce Commission to permit the railroads to charge a slight excess on trunks more than forty-five inches in height.



ELECTRIC TRUCKS ARE NOW IN GENERAL USE IN ALL BIG TERMINALS, AND THE BAGGAGE MAN IS OBLIGED TO HANDLE UNITED STATES MAIL AS WELL AS PASSENGERS' BAGGAGE

The "baggage smasher" has departed with the brass check and the "Saratoga." In the baggage-rooms of the Grand Central or the Pennsylvania in New York City, where nearly ten thousand trunks are handled each day, you can see no "baggage smashing." A man does not have to lift trunks several feet to place them on a truck, nor throw them off at the baggage car.

Of course baggagemen have a way of rolling trunks—spinning them deftly across the floor on their corners, but that is far safer than dragging them about. Dragging causes the handles to pull out or the ropes to become loose. Furthermore, every railroad is very strict as to the way trunks are handled. In every book of rules governing the department an order in italics or capitals states that under no circumstances may a trunk be thrown or dropped.

Trunks are handled as carefully here as they are abroad, but for a different reason. In Europe trunks are treated without violence because the traveler proffers a tip when he inspects his baggage. There is no checking system in Europe. Each passenger gives his personal attention to having his trunk placed aboard the train when he starts and to having it unloaded when he arrives. The cautious traveler visits the baggage-car frequently at stops to examine his luggage.

In summer the baggageman works hardest. All who can afford it leave the city for a vacation. That means a stream of trunks from June until the end of August, but it reaches its maximum in the first week in September, with its homeward rush. The great railroad terminals in and about New York City are literally inundated with trunks.

A similar condition obtains in a smaller way in every city depot throughout the country.

Labor Day is a general holiday in the United States, and is the first Monday in September. Hundreds of thousands plan their vacation so that it will end with this last of the summer holidays. The homeward bound trains are packed, none carries a baggage-car. The baggage is handled by separate trains.

Before Labor Day the general baggage agent marshals his forces and prepares his plan. The passenger and the baggage departments of every great trunk line leading to New York City mass their coaches and cars at various points north, south, east and west to accommodate the travelers and their trunks. Statistics for preceding years are studied.

These statistics cover the travel from hundreds of summer resorts. This station or that station had so many city-bound passengers at this time a year ago; so many new hotels have been built since; the agent reports that so many people are stopping there now, and the hotel keepers say that such and such a percentage will remain over Labor Day. An estimate is made and a sufficient number of passenger-coaches are ordered to that point, with baggage-cars at the rate of one for eight coaches.

If there is a drop in temperature on Sunday or Labor Day the carefully laid plans of the passenger and baggage departments must be revised. Cold weather causes change of minds, and the Labor Day rush is thus augmented. That is why the baggagemen at the great terminals desire hot weather until after Labor Day, for the vacationists will then return more gradually.

How to "Read" a Check.

No matter if the city expressmen work night and day hauling trunks from the terminals in this rush season, the baggage is piled high for days. One wonders how the baggagemen are able to match checks so quickly and choose the right trunk from the great piles.

As fast as the trunks come in they are sorted into ten great sections. These sections are numbered consecutively from one to ten, inclusive. The trunks are classified according to the third figure from the end of the check number.

For instance, if the trunk check is numbered 123456, the trunk will go to section 4. If it is 8050 it goes to section 0, and so on. After much study this system was originated by the head of the baggage department at the Grand Central two or three years ago and is now in use in all big terminals throughout the country.

The reason for using the third figure is this: One person may check two or three or more pieces of baggage at the same time. The checks are numbered consecutively, say, 82263, 82264, 82265, and 82266. If they were classified according to the last figure they would go into four different sections, and the work of finding them would be quadrupled. If the second figure were used, there would still be a chance of their being separated, but it is very seldom indeed that two or more pieces belonging to the

same person are not all of the same third figure.

Baggage-cars and baggage-rooms are so carefully watched that the stealing of baggage is very rare indeed. The principal difficulty is baggage going astray. No matter how careful employees may be, a trunk will now and then lose its "ticket." When this occurs a description of the piece of baggage is immediately sent to the general baggage agent who starts an inquiry by wire. So complete is the system of records, however, that few trunks are lost more than twenty-four hours

Much imagination has been used by writers in describing the "morgue" of the baggage-room where the unclaimed trunks accumulate. Not once in a thousand times, however, does a trunk remain unclaimed if it contains anything of value. At certain intervals this unclaimed baggage is sold at auction. There are more disappointments than agreeable surprises, however, in buying unclaimed baggage.

The train baggageman has things other than trunks consigned to his care. Usually he handles and distributes the railway mail—the letters and reports to and from stations and the general offices and other places along the road. In summer time especially the train baggageman is likely to have several dogs in his car. The rules demand that the animal be securely fastened by rope or chain. Some roads require muzzles.

On local runs into large cities some commuters have established the practise of riding in the baggage-car. Of course there is a solemn rule against this, and probably that is why the special privilege is so desirable. It must be obtained from the general passenger-agent. The baggage-car is a delightful place in which to ride a short distance in summer, when the doors are open. On local runs there are not many trunks and the baggageman has interesting gossip

It was this baggage-car habit, by the way, that brought about the "club car" which is a feature of many of the roads running into New York City—a special car that is occupied always by the same passengers who pay slightly in excess of the regular fare for the privilege

The train baggageman is paid according to the length of his run. His salary varies from $70 to nearly $100 a month. The baggage handlers at the big stations receive from $60 to $70 a month, and the check men about $72. A baggage master at an important point will draw from $1,200 to $1,800 a year, and an assistant general baggage agent from $1,800 to $2,500. The general baggage agent's salary is about $3,000 a year on a large road.

The man who enters the baggage service generally remains there. His is a specialized job, and the training does not fit him, unless he is unusually competent, for an executive position in any of the other departments.

CALLING IN THE FLAG.

BY STRICKLAND GILLILAN.

"WE may stick on the grade," said old Hoghead Slade,
"For the rails are as slippy as hell
But we've plenty of sand and she's steaming just grand,
And we'll fare in the end pretty well
We will send back a flag if the girl chews the rag,
When the tallow-pot's tucker is gone,
But we stir up the steam and I click to my team—
We call in the flag and go on."

Oft I think of old Slade when I'm on the upgrade
And my steam isn't working just right;
When I think "What's the use," and make every excuse
For giving up hope in the fight
But I send back a flag while my spirits that lag
Are rallied till weakness has gone
Crying "Never say dead!" I just plug on ahead -
I call in my flag and go on

HOGGER SURVIVES 24 WRECKS.

Though He Has Passed Through a Series of Remarkable Mishaps, W. E. Ragsdale, Veteran of the Southern Pacific, Has Been Injured Only Twice.

BY R. J. CASEY.

ONE of the most unusual records of the railroads in the Southwest is held by W. E. Ragsdale, who has been an engineer for thirty-five years and is still pulling a throttle for the Southern Pacific

W. E. RAGSDALE KNOWN AS THE "MOST REMARKABLE ENGINEER OF THE SOUTHWEST"

out of Houston. In his extraordinary career he has survived twenty-four wrecks for none of which he was to blame

The Southern Pacific officials say that he is a careful driver. Seldom has he known the proximity of danger, but has plunged into the shadow of death, later to crawl from the wreckage. Among the accidents are numbered some of the oddest in the history of his road

He has been injured only twice. In the collapse of a trestle his chest was crushed and he spent seven months in a hospital He suffered a dislocated nose and broken ankle in the wreck of the first Sunset Limited. From the other collisions and derailments he emerged unscathed, and to-day, a few years beyond fifty, he is almost as physically fit as when first he stepped into an engine-cab.

Ragsdale comes from a family of railroaders. An uncle and three cousins spent almost a lifetime on the Nashville and Chattanooga road, where Ragsdale received his first training

Ragsdale began as a brakeman in 1860 when trains carried no air-brakes

The young railroader scarcely had time to smear his new overalls with grease when a catastrophe almost caused him to forsake his chosen field.

Not Called for Death-Train.

The crew of which he was a member was called one night to take charge of an excursion-train running into Nashville, where a widely advertised fair was being held. The train had been divided into two sections—one for negroes and the other for whites. The white section was to run behind the colored. Ragsdale was called for the second section, but the plans were changed. The negro section was held back to give the white precedence, and Ragsdale's crew was not sent out.

A few hours later the wrecker was called and Ragsdale went with it. The white section had gone through a bridge over Big Harper River at Kingston

Morning was just breaking over the rolling green hills of the valley, and on the deep blue grass along the river bank lay the bodies of the victims—one hundred and twenty. An investigation brought out the fact that the timbers of the trestle had been sawed by an unknown fanatic who probably had intended to catch the negro division in the death-train

Only the persuasion of Ragsdale's relatives induced him to return to the service but after the harrowing memory of the wholesale slaughter had worn off never after that—though the thrills came fast—did he evince a desire to choose another occupation. A few years later he allied himself

with another road—the Nashville and Northwestern—and in 1873 he became a fireman on a wood burner. His exciting career had really begun

In the following year, while running light, a bridge collapsed and the locomotive and its lone car fell thirty-two feet. None of the crew was hurt though the locomotive was battered to scrap. The accident was typical of the many that followed.

In 1876 he went to Houston as a fireman on the Galveston, Harrisburg and San Antonio, the present Southern Pacific trail west from Houston. At that time the road was not complete. A year later he joined the Houston and Texas Central, which was also destined to become a part of the Sunset system. He was given his first engine in 1878 on the narrow-gage Houston, East and West Texas, which, too, was eventually merged with the S. P

Freight Went Through Trestle.

In 1882 he experienced his first accident as an engineer. A few miles north of Nacogdoches, Texas, he ran too fast for the narrow-gage rails and his engine turned over. He was drawing a string of freight-cars, but they remained on the track and no one was hurt

In January, 1886, he accepted a place on the Texas and New Orleans, the Southern Pacific east of Houston, with which road he has been ever since

For three years fortune favored him. Then came the accident which nearly ended his career. The Texas and New Orleans trestle over White Oak Bayou, near Houston, collapsed under a heavy freight that he was driving. The engine and thirty cars fell sixty-two feet. He had almost crossed the trestle when the crash came. A brakeman at the head end was killed.

The locomotive cab was demolished and the wreckers thought it impossible that any one on the deck could have escaped The fireman had been pitched through the cab window and was uninjured save for a few bruises. Ragsdale's chest was crushed by a heavy beam, but he wormed his way to safety.

For seven months he fought for his life and won.

In 1897 a side-rod of his engine broke about two miles west of Devers, Texas, while he was traveling about thirty-five miles an hour. As the broken rod whipped about it took off the side of the cab Ragsdale put on the air and ducked. The next swing of the rod demolished the cab and hurled the fireman and engineer clear of the train. Neither was hurt.

It is of the Sunset Limited, wrecked a few months later, that Ragsdale likes to tell. Among his most cherished possessions is a cardboard replica of that famous train as it appeared the day he met it at Lafayette, Louisiana. Every portion of every coach is shown with attention to color and design

Ragsdale was deadheaded from Houston to Lafayette to bring in the train on its maiden trip. Superintendent Mulvey was at the station when he arrived.

"Ed," he said; "I want you to take this train into Houston on time!"

"I'll take her into Houston," answered Ragsdale, "if the wheels will stay on the rails."

The limited reached the Louisiana town on time and the crew climbed aboard. It is forty-one miles from Lafayette to Jennings. The limited made the distance in thirty-seven minutes. Two minutes and a half from Jennings the run ended in a swamp.

"The engine gave one leap," says Ragsdale; "then she turned over in five feet of water. Every coach in the train left the track and there wasn't a wheel left under anything."

The locomotive stopped with her trucks in the air. The cab was splintered and the remains of the tender were heaped on the wreckage. Ragsdale found himself under water with one foot caught in the reverse lever. He wrenched his foot free, but did not free himself until his ankle-bone had snapped.

Ran Unhurt Through Three Cars.

That was the last of the limited. The engine was rebuilt and at present is in passenger service

At Dayton, Texas, a few years later, a freight-train that should have taken a siding to clear for Ragsdale was stalled on the main line, and he ran into it at high speed, demolishing three box-cars without injury to any one His last wreck was quite similar. It is a rule of the Southern Pacific that an engineer taking a siding must extinguish his headlight. One night, as a passenger-train was about to run on to a siding, the headlight was accidentally extinguished, and instead of proceeding and clearing the main line, the engineer halted the train to repair the headlight which he thought had been damaged. Ragsdale ran into the engine head on.

In the investigations which followed his many mishaps, Ragsdale was exonerated by the company, but, finally, as he seemed to be the victim of persistent ill fortune, he was transferred to the accommodation service.

AT THE MERCY OF MOSLEMS.

What Three American Revolvers Did When the Test Train Was Stalled by a Desert Sand-Storm and the Passengers Were Attacked by Desperate Arabian Bandits.

BY I. F. FERRIS.

"RAILROADING in a country where the bulk of the inhabitants are lawless and opposed to the railroad is apt to afford experiences that are lively enough to satisfy the most adventurous," observed Alkazin, former traffic-inspector on the Egyptian Delta Railway.

"That was the situation when I was on the Egyptian Railway. The natives hated the foreigners, hated their foreign law, hated the railroad which they had built, and made actual war on all connected with it. They would wait patiently for weeks and months for an opportunity to make trouble for us.

"One day we were trying out on the Kaffr Hamza division, of which I was in charge, one of a half dozen Baldwin locomotives which the chief engineer had imported from the United States. In ordering this equipment from America he had offended the owners of the railroad, who were Englishmen, and we were doubly anxious for that reason to see the locomotives make good.

"I had not attached my private car to the train that morning, but had chosen to ride in the baggage and express car, one reason being that we were carrying a considerable amount of coin to a firm of bankers located at the terminus.

"It was a bright, clear morning, and we got along all right until we had rounded a mountain, Tell-El-Yahodieh, beyond which the road ran for miles through a sandy desert, absolutely deserted save for an occasional band of roving Arabs or an escaped convict.

"As we rounded the mountain the air darkened, the sun disappeared, and I knew we were in for a sand-storm. They were not likely to be serious in that locality, being usually of short duration, so I did not worry.

"The engineer, however, had cause to worry. The French and English locomotives which had been used on the road up to that time had their works concealed by sheet-iron which extended over the sides of the engines down to within six or eight inches of the track.

"The Baldwin engines were of the regular type and the parts were exposed. While the mechanism was perhaps superior to the European built patterns, the sand drifted into that locomotive, cutting and grinding until it could barely crawl.

Three Revolvers Saved Train.

"The more power the engineer put on, the worse the sand cut, and finally the train came to a dead stop in the middle of the desert, while the sand swirled about the coaches and sifted through the windows of the cars into our eyes and ears.

"The passengers were badly frightened, but I soon reassured them, and we labored for an hour trying to start that locomotive. It was of no use, but as the storm had abated, I prevailed on one of my men, a native who was not afraid of desert storms, to go on foot to the next telegraph station and wire back to Beltan on the main line for an engine.

"He had barely left when a band of

Arabs appeared, seemingly from nowhere. They came galloping up on their beautiful horses, brandishing their long-barreled guns in the air and yelling like fiends

"The sand storm had not bothered them in the least, although they must have been out in the middle of the bare desert. An Arabian horse knows how to lie down in such storms, tuck his head under so as to protect his nostrils and eyes, and his master cowers safely inside of the hollow formed by the steed's curved body.

"Naturally the passengers, already nervous from their experience, thought that we were all to be slaughtered in cold blood, and when those imps of the desert began to fire shots in the air as they circled about the stalled train, most of the passengers got down between the seats and began to pray or curse as their natures indicated

"There were on board three sturdy Englishmen who had traveled all over the world. Each was armed with American revolvers. In this instance the American revolver was a better friend than the American locomotive, for those men promptly ranged up alongside the train-crew and did fine execution with their guns

"It was a warmer reception than the Arabs had anticipated and, after ten minutes of lively fighting, they whirled off into the desert as rapidly as they had come, firing parting shots at us from their guns as they went.

"Two of them remained and approached me after the strife was over. I realized afterward that they must have dismounted and allowed their comrades to take their horses, but I did not think of it at the time.

Stalled by Sand-Storm.

"With many supplications, much bowing and obeisance, and many exclamations of, 'Oh, good Effendi, Most gracious Effendi, Most generous Effendi,' they finally explained that they were not antagonistic but had been pressed into service by the lawless band which had just assailed us, and they sought my protection

"The passengers were keeping me too busy to pay much attention to the natives, and I turned them over to one of the trainmen, telling him to keep an eye on them. By the time the relief engine arrived from Beltan I had forgotten them.

"We set about pulling the train back, it being impossible to move the stalled locomotive, and found that before it had stopped, the sand had packed so tightly under the wheels of the express-car and banked so hard against the tracks that that car, which was next the engine, had run off the track and could not be moved until we had the aid of a wrecking-train

"There was nothing to do but to send back the rest of the train and for part of us to stay with the engine and express-car until the wrecker arrived. After the train had left, much to the relief of the passengers, I thought of the two Arabs. They were nowhere to be seen, and I have not, to this day, any idea where they had hidden themselves.

Engineer Fell on Knife.

"The train hand who had them in charge had gone back with the train and it seemed probable that he had taken them along. There were left, to guard the locomotive and car with its treasure, only the engineer, the fireman, one of the Englishmen, who had insisted on staying, and myself.

"As the tail end of the train disappeared around the base of the mountain I saw a cloud of dust on the desert and in five minutes the band of Arabs was back again. While we were watching them approach from the window of the express-car I felt an arm steal around my neck and, turning and twisting, saw the white robes of one of the two who had sought for my protection.

"As I struggled to grasp his right hand, which I had no doubt held one of those pretty Egyptian knives with an inlaid handle but a very long and sharp blade, I saw that the Englishman had been similarly attacked by the other. The whole thing was done so silently, covered as it was by the noise made by the band outside, that neither the engineer nor the fireman had noticed it.

"Neither of us could call out for aid, throttled as we were, and we all writhed about the floor of that car for minutes that seemed to be hours. I got a grip

on that knife hand and tried to work my way over to where I could kick one of the other men to warn him of my plight, and the Arab tried as hard to keep me from doing it.

"He was more than a match for me, and only my anger at the way I had been deceived served to enable me to resist him sufficiently.

"Finally I wormed my way to where I could stick one foot out behind me and trip up the engineer, who fell on top of us and got a prick from the point of the knife as he did so. This roused him to a sense of what was going on behind his back.

"Almost at the same instant the Englishman got one hand on his revolver and began to fire. He clipped me with the first shot, but then got the muzzle of his gun twisted around against the Arab's body, and the way he pumped lead into that chap was a marvel.

"We threw the bodies out of the door of the car, and the sight of them, together with the fact that the Englishman had reloaded and was giving a fair imitation of a Gatling gun in action, unnerved the band outside and they moved off a little distance. We were glad enough to stop and take a long breath ourselves

"They made one sortie after that, galloping close up to the car, two of them grabbing up the dead men from the ground while the others kept up a continual firing, but then they whirled off into the desert, apparently satisfied that four 'dogs of infidels' were more than a match for a dozen Moslems.

"The wrecking-train hauled us out about nightfall, and our casualties consisted of two very stiff necks, where we had been throttled, one little hole in the engineer's thigh, where he had fallen on the knife, and a slight furrow where the Englishman's first bullet had plowed across my skin

"That was fair so far as the battle went, but the record of the locomotive was so poor that the chief engineer lost his position."

SHIPPING BUFFALO TO SAVE THE SPECIES.

Fifteen Transported to National Reserve in Oklahoma in Special Made Up of Six Express Cars.

TO aid the government in its attempt to save the American bison from extermination, the New York Zoological Society recently shipped fifteen buffalo of pure breed to the national reserve in southwestern Oklahoma. The animals were transported in "The Buffalo Special," a train made up of six express-cars. The buffalo were the sturdiest survivors of twenty-six that were presented to the zoological society a few years ago by the late William C. Whitney

To found and permanently maintain the herd, the government has set aside twelve square miles of fine grazing ground known as the "Wichita Bison Range." The region is one of fine pastures, rolling prairies, and an abundance of water. It was once the habitat of the great Southern herd of several million animals which were destroyed by hunters prior to 1874.

For the journey to Oklahoma the buffalo were placed in large, well-ventilated steel cages. From their corrals in the zoological park in New York City, they were driven through a wooden chute which led to the door of the shipping cage. Once clear of the entrance, the door was quickly dropped and the animal imprisoned. The cages were then hauled to the rail road terminal. A cowboy was placed in charge of the shipment.

At present there are but two herds of wild bison in existence. The larger, of perhaps three hundred, inhabits a wide stretch of barren and inhospitable territory southwest of Great Slave Lake in northwestern Canada. The other herd of but twenty animals still exists in Yellow stone Park. Originally there were about two hundred animals in the herd, but they have been slaughtered by poachers.

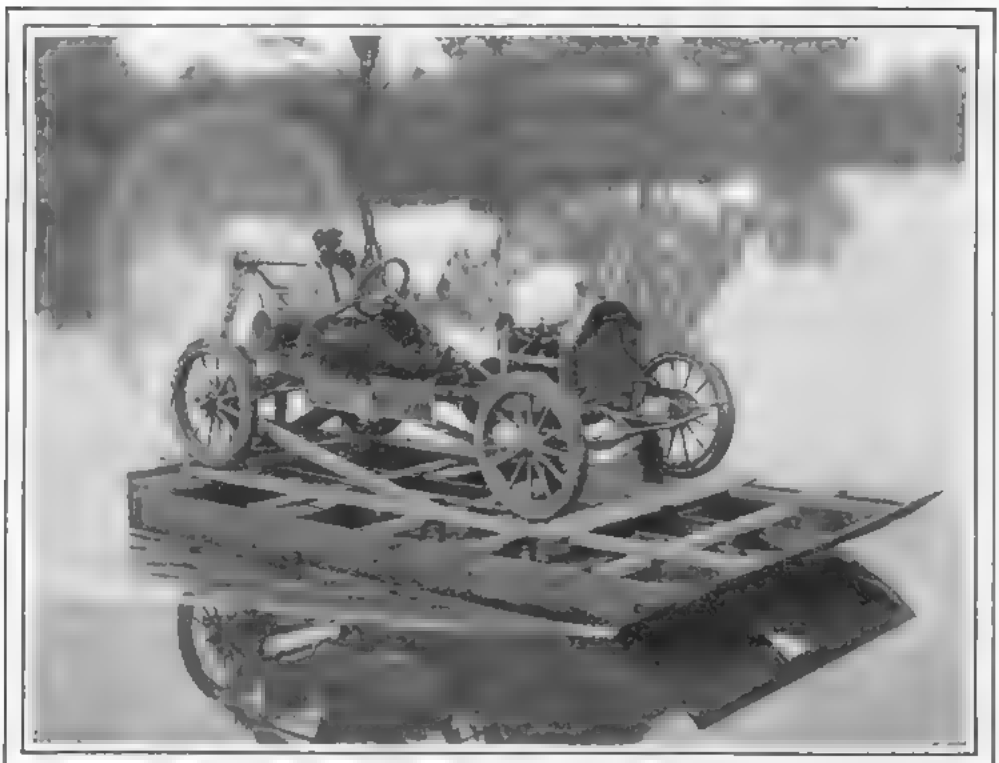
W. T. Hornaday, director of the New York Zoological Park, and president of the American Bison Society, was also instrumental in establishing a small herd on the Flathead Indian Reservation in Montana. The buffalo were purchased with a fund of $10,000 and presented to the government. The four or five herds now in existence will probably enable the government successfully to preserve the species.

CURRENT MECHANICS

A Department Devoted to the Progress of Mechanical Development—Written, Illustrated and Analyzed So that It Is Plain to Everybody.

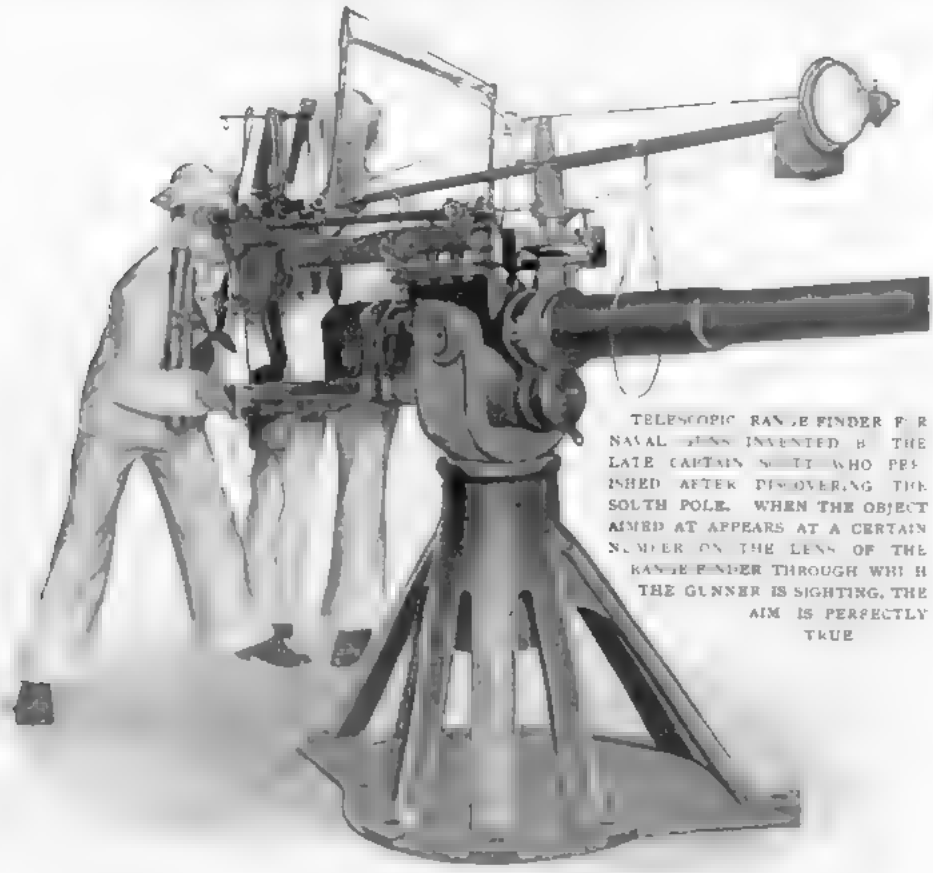
DRIVING A BOAT WITH AN AEROPLANE PROPELLER.

A CURIOUS motor-boat was constructed recently to demonstrate that a propeller similar to those used on air-ships will drive a boat through the water by forcing back the air. To accomplish this, a buckboard motor-car was mounted on a flat-bottom boat, and a driving shaft with a two-blade propeller fitted to the rear of the car. The propeller shaft was equipped with a sprocket-and-chain running gear, and the power was supplied by the motor-car. The propeller attained a velocity of 750 revolutions a minute. The action of the wind-propeller forced the boat ahead at a lively clip.



FERRYING DOWN A RIVER WITH A MOTOR-CAR TO PRODUCE THE POWER AND AN AEROPLANE BLADE INSTEAD OF A PROPELLER

RANGE FINDER FOR WARSHIPS INVENTED BY CAPTAIN SCOTT WHO LOST HIS LIFE AT THE SOUTH POLE.



TELESCOPIC RANGE FINDER FOR NAVAL GUNS INVENTED BY THE LATE CAPTAIN SCOTT WHO PERISHED AFTER DISCOVERING THE SOUTH POLE. WHEN THE OBJECT AIMED AT APPEARS AT A CERTAIN NUMBER ON THE LENS OF THE RANGE FINDER THROUGH WHICH THE GUNNER IS SIGHTING, THE AIM IS PERFECTLY TRUE

Photograph copyrighted by Edwin Levick New York

CAPTAIN ROBERT FALCON SCOTT of the British navy, who with a party of heroic comrades struggled to the South Pole and then met death from hunger and cold, left more than an immortal achievement in exploration to glorify his name

Only a few months before he started on his fatal expedition he invented a attachment for naval guns by which he claimed, it is possible to take faultless aim at any object discernible through a telescope as far as fifteen miles. The attachment, shown in the accompanying illustration, consists of a rod on one end of which is mounted a telescopic lens.

On the lens are small marks numbered from 1 to 15. These numbers indicate miles. If an enemy's warship were, say eight miles away, it is only necessary to focus the lens in such a manner that the ship would appear on mark No. 8, and fire the gun.

The fact that the ship appeared at eight on the lens assures the gunner that his aim is true as his mark will not show at the correct number unless the gun is accurately sighted. Several guns equipped with Captain Scott's attachment are already in use in the British navy

FIGHTING HAIL-STORMS.

IN the course of an inquiry on the subject of hail-storm insurance the International Institute of Agriculture has recently collected statistics of the amount of damage annually wrought by hail in various countries of Europe

In round numbers these losses average $20,000,000 in Germany, $20,000,000 in France, $12,000,000 in Italy, $6,000,000 in Austria, and elsewhere more or less in proportion.

The magnitude of these figures explains why the cultivators of the Old World are not only deeply concerned about placing insurance against hail on a satisfactory basis, but are also prone to grasp at straws in the shape of chi-

merical plans for actually preventing the fall of hail upon their crops.

The expedients adopted have varied from age to age. In antiquity it was commonly believed that storm-clouds could be dispersed or driven away by discharging darts and arrows at them.

Among the Romans there were weather-wizards — *tempestarii* — who made a specialty of dispelling storms and averting hail. Throughout the Middle Ages, and down to a comparatively recent time, a belief in the necromantic control of the elements survived, as is witnessed by the trial and execution of thousands of alleged witches, one of whose commonest misdeeds was supposed to be a malevolent use of the power to conjure up hail-storms.

Ecclesiastical aid was commonly invoked against hail. Special prayers and rituals were prescribed to avert this scourge; while to this day the ringing of church-bells and the erection of "hail-crosses" are considered efficacious for the same purpose in Europe.

The practise of cannonading the clouds to avert hail is hundreds of years old, having begun in Italy and Austria, and subsequently spread to France. Toward the end of the eighteenth century this practise was generally abandoned in favor of another—the erection of "hail-rods" in fields and vineyards.

These rods, also known as *paragrêles*, were a crude imitation of the then recently invented lightning-rod; and it was believed that in some mysterious fashion they prevented the formation of hailstones by "drawing the electricity out of the clouds."

They enjoyed enormous popularity for three or four decades, until there came a season of particularly severe hailstorms which not only ravaged the fields that these contrivances were supposed to protect, but knocked down the rods themselves in great numbers.

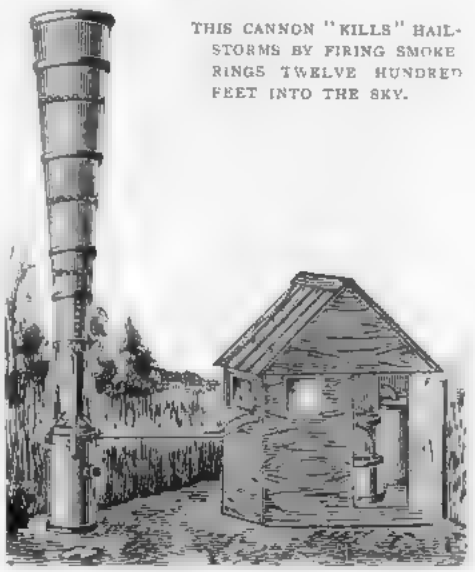
From that time the vogue of the hail-rod rapidly declined.

In recent years both the hail-cannon and the hail-rod have been revived, though in less crude forms. A revival of "hail-shooting" began in the year 1896 in the vineyards of Styria, and the practise spread with great rapidity all over southern Europe.

A special form of cannon was introduced for this purpose—a mortar having a funnel-shaped muzzle, which discharged no projectile, but sent aloft a whirling ring of smoke supposed to cause sufficient commotion at the level of the clouds to prevent hail formation.

Hail-cannon are still in use, especially in France, and are now made in several styles, for each of which particular virtues are claimed. In one form acetylene is used as an explosive in place of gunpowder.

Supposed improvements on the cannon are the hail-bomb and the hail-rocket, both of which are designed to reserve their explosive energy until actually reaching the clouds. Sad to say, the vast amount of money that has been spent on hail-shooting has benefited



THIS CANNON "KILLS" HAIL-STORMS BY FIRING SMOKE RINGS TWELVE HUNDRED FEET INTO THE SKY.

nobody but the manufacturers of the guns and ammunition.

In this respect the practise is exactly on a par with the rain-making mania that periodically breaks out in the United States—with the exception of the fact that the more enterprising Americans now utilize these bombardments of the clouds as subjects for moving pictures, drawing cards for rural fairs, or means of securing personal notoriety for the promoters.

A new form of hail-rod has been introduced recently in France, and is becoming a great deal more popular than the cannon.

This is essentially a very large lightning rod of pure copper, terminating in a cluster of gilded points. It goes under the sobriquet of the "Electric Niagara," in allusion to its supposed ability to draw "cataracts" of electricity from the storm-clouds.

One of these rods was installed two years ago on the Eiffel Tower, and the government has appointed a commission to consider the question of erecting rods throughout the country

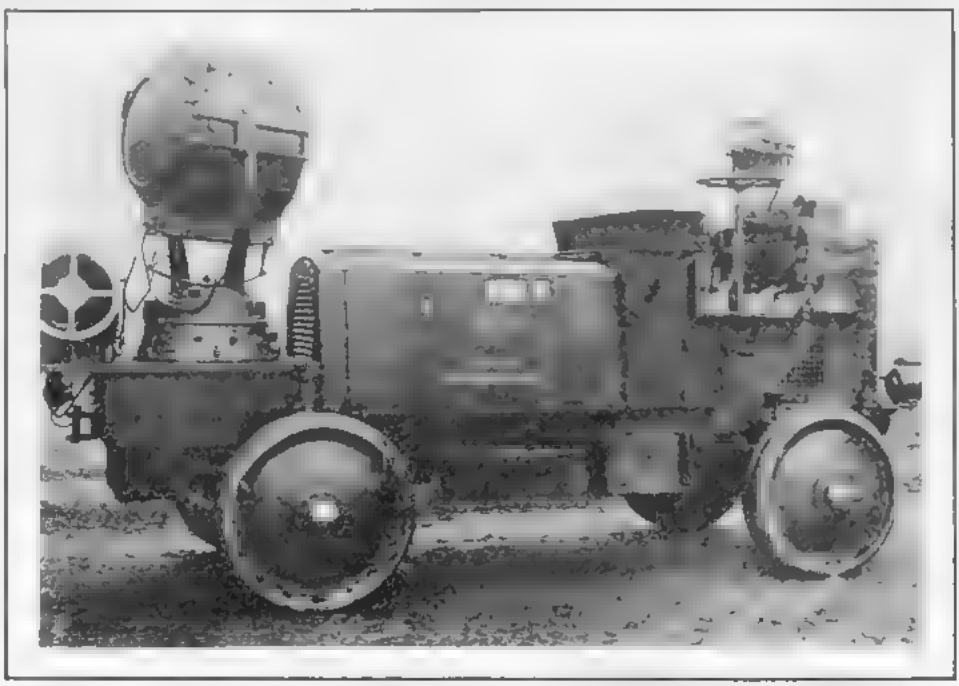
Already, however, the new device has conspicuously failed in several instances, and its vogue seems likely to be short-lived.

For during the past year some severe hail-storms have occurred in the immediate vicinity of the Eiffel Tower.

Finally, the use of Hertzian waves to prevent hail formation has been suggested, but probably not yet actually attempted.

This expedient, like all the rest, inspires little confidence among scientific men, because it bears no apparent relation to the known mechanism of the thunderstorm, of which hail is an attendant phenomenon and a damage-making adjunct

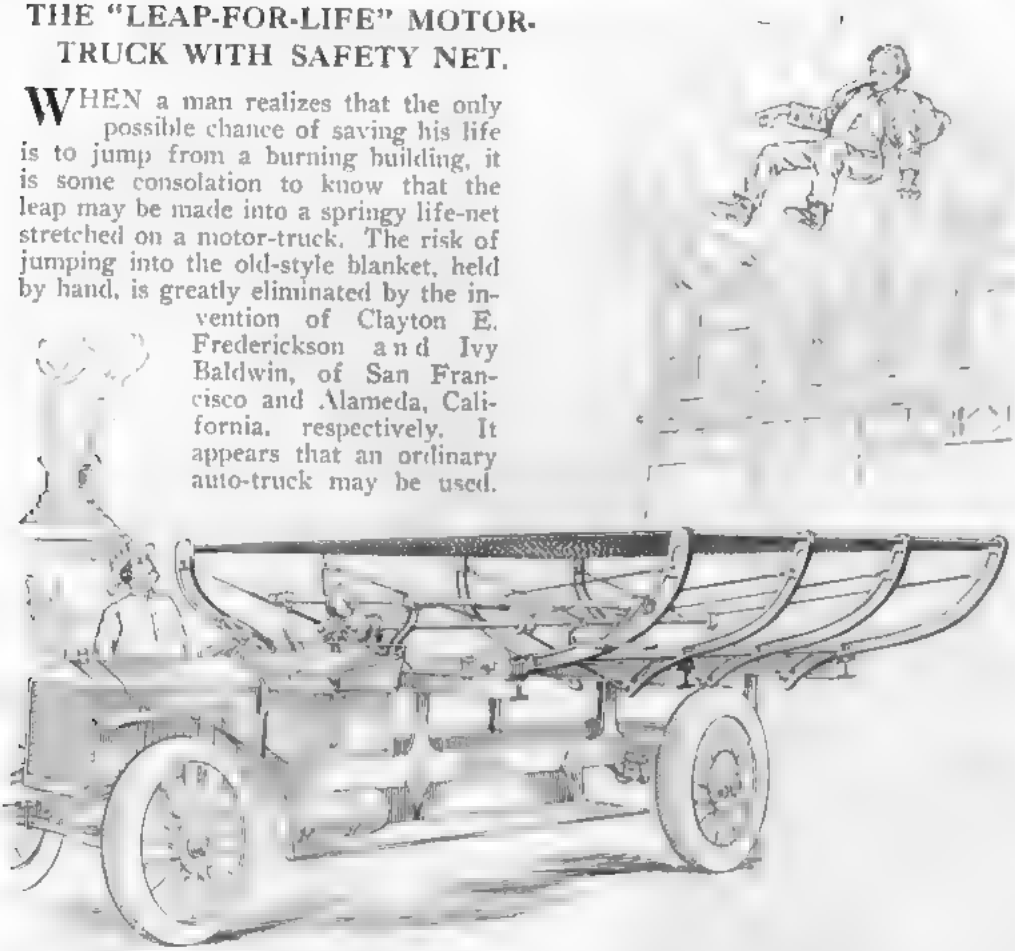
SEARCHLIGHT CAR FOR THE UNITED STATES ARMY.



AMONG THE MACHINES FOR MODERN WARFARE THAT UNCLE SAM HAS ADDED TO HIS EQUIPMENT NONE HAS ATTRACTED SO MUCH ATTENTION AS THIS ENGINEERS' SEARCHLIGHT CAR. MOUNTED ON A HEAVY MOTOR-TRUCK, IT CARRIES A POWERFUL REFLECTOR WHOSE BLINDING RAY IS EXPECTED TO WORK HAVOC IN A NIGHT ATTACK

THE "LEAP-FOR-LIFE" MOTOR-TRUCK WITH SAFETY NET.

WHEN a man realizes that the only possible chance of saving his life is to jump from a burning building, it is some consolation to know that the leap may be made into a springy life-net stretched on a motor-truck. The risk of jumping into the old-style blanket, held by hand, is greatly eliminated by the invention of Clayton E. Frederickson and Ivy Baldwin, of San Francisco and Alameda, California, respectively. It appears that an ordinary auto-truck may be used.



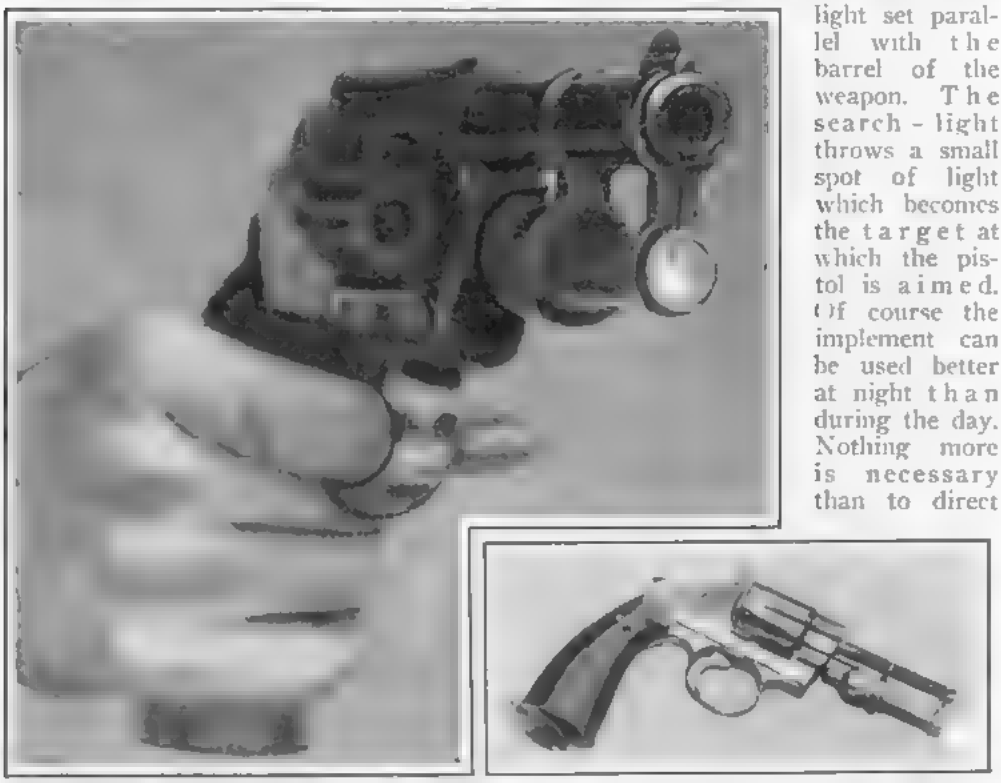
The frame is fitted with eight supports on which the life-net is stretched. The eight supports turn on pivots, and when the machine is not in use they may be raised by turning a crank at the rear of the motor. This operation folds the net and renders the machine easier to handle when hustling to a fire. Many a person has lost his or her life when cut off from rescue in the upper stories of burning buildings when a suitable device might have tempted them to jump. The Frederickson-Baldwin invention, which we illustrate fully here, should appeal to the fire department of every municipality.

DID YOU EVER INVENT ANYTHING?

IF you have, the Current Mechanics Department offers you an opportunity to bring your invention before the public. This is a rare chance for the inventor who thinks he cannot find a way to let the world know what he is doing. If you have an invention that seems to be practical, let us see it. Describe it in three hundred words or less and mail it with photograph, blue print, or original sketch. We will pay promptly for whatever we accept. Unless accompanied by stamps, manuscripts or drawings will not be returned. Address, Current Mechanics Department, The Frank A. Munsey Company, 175 Fifth Avenue, New York.

SEARCHLIGHT GUN MAKES YOUR AIM DEADLY.

THE enterprising burglar and the vengeance-wreaking gunman have a new device to assist them in their predatory efforts. It is a searchlight and pistol combined. The simplest novice can hit the bull's eye with one of these weapons as the bullet always strikes the spot touched by the point of light. The revolver throws a searchlight on the spot where the bullet will strike. Its mechanism is altogether simple. It consists merely in the adjustment of an electric searchlight set parallel with the barrel of the weapon. The searchlight throws a small spot of light which becomes the target at which the pistol is aimed. Of course the implement can be used better at night than during the day. Nothing more is necessary than to direct the searchlight from point to point until it falls on the object one desires to shoot. All that is then necessary is to pull the trigger.



THIS COMBINED SEARCHLIGHT AND PISTOL MAKES IT AN EASY MATTER FOR THE GUNMAN TO FIND HIS OBJECT. THE SHAFT OF LIGHT PENETRATING THE DARKNESS GIVES A DEADLY AIM. WITH IT THE AMATEUR BECOMES AS CRACK A SHOT AS THE EXPERT

ARE YOU A HOUSEHOLD MECHANIC?

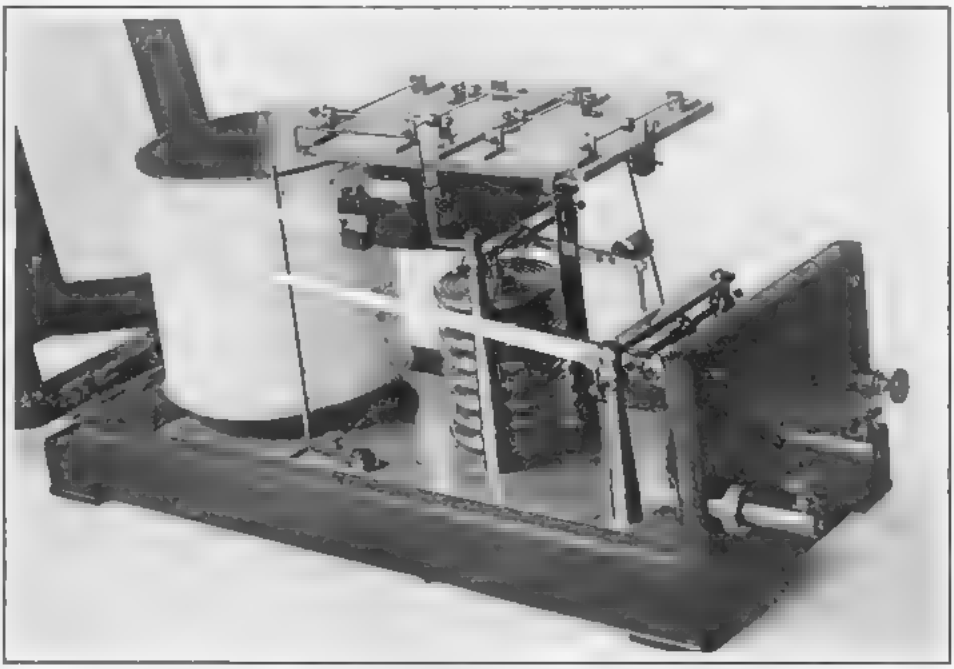
SOME of the greatest inventions originated in the household. The daily routine of the home suggests many things to save time and labor. Our patent records show that the busy housewife has given the world many of its most useful articles. Our Current Mechanics Department wants to get in touch with these practical inventions. Describe your invention in three hundred words or less, and send it to us with a drawing or photograph. Unless accompanied by stamps, manuscripts or drawings will not be returned. Address, Current Mechanics Department, The Frank A. Munsey Company, 175 Fifth Avenue, New York.

ONE OF THE SCORES OF ENGLISH WOMEN WHO ARE OBLIGED TO DO MANUAL LABOR.

WHERE WOMEN WORK THE TRADES.

IT is not an uncommon sight in Great Britain to see women actually working in machine-shops or at the forge Here is a picture taken in a Kentish town of a woman working at a drill. Such a scene is not hard to find in any small English city where the struggle for existence is very severe. In Great Britain, to-day, there are too many men who shirk work and actually let the women toil for them. This photograph tells more than volumes of words

RECORDS FLASHES OF LIGHTNING 100 MILES AWAY.



ONE OF UNCLE SAM'S SENSITIVE SENTINELS OF WEATHER CHANGES. EVERY TIME A FLASH OF LIGHTNING OCCURS IN ITS TERRITORY THIS MACHINE RECORDS THE FLASH

If ever you visit the Government Weather Bureau in Washington you will see the most remarkable collection of queer-looking instruments. They have a special mission in government work inasmuch as they keep a minutely accurate record of the most changeable thing in all the world—the weather.

The instrument shown in the above photograph is known by three names. Some call it a lightning recorder, others a lightning alarm, but the man who invented it, Professor Zapara, christened it the ceraunograph.

Its particular duty is to record flashes of lightning, and it is so sensitive and delicate that whenever a thunder-storm is apparent within a radius of one hundred miles it gets busy and records the flashes of lightning as they occur. The instrument is a combination of the aneroid barograph and the receiving apparatus commonly used in wireless telegraphy. There is a similar instrument in Washington which not only registers the intensity of each flash of lightning, but tells approximately which way the storm is moving.

SEND ALONG YOUR GOOD IDEAS.

WE want ideas accompanied by illustrations for the Current Mechanics Department of this magazine. We want ideas that have something back of them. Ideas that are new and original—that may be worked up into something useful and practical. We want ideas that cover every phase of human endeavor. We will pay promptly for any that are acceptable. Unless accompanied by stamps, manuscripts or photographs will not be returned. Address, Current Mechanics Department, The Frank A. Munsey Company, 175 Fifth Avenue, New York.

POWERFUL HOISTING MAGNET.

HOW can a man cling to a chain attached only to the ground below him? This was actually accomplished recently in a foundry where they use electro-magnets for hoisting and moving.

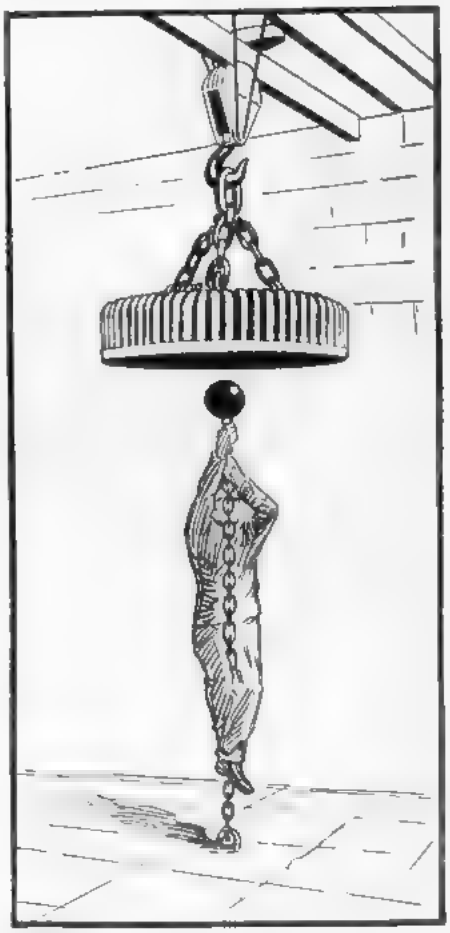
A cannon-ball was fastened to the floor by a strong chain. An electro-magnet, placed over the cannon-ball and put into action, attracted and held the chain vertically. A workman then climbed the chain to the cannon-ball. While he did this the chain remained as vertical as a pole. This apparent contradiction of the laws of gravity is simply due to the fact that the electro-magnet, very powerful, was able to raise not only the mass of the cannon-ball, but also the weight of the man

The magnet used as a means of hoisting is not uncommon in many places. As a means of loading scrap-iron and steel on cars it is extremely practical. It will also hoist nails in kegs

THIS FISH CAN CLIMB TWENTY-TWO FEET.

A SOUTH AMERICAN fish that can climb out of a deep pot-hole and even creep against a strong current, on the bottom of a swift stream, was described recently to the New York Academy of Sciences by Mr. R. D. O. Johnson, a mining engineer who has spent several years in the highlands of Colombia. The climbing or creeping catfish resembles closely the horned pout or "bullhead" of the United States

"Under usual conditions," writes Mr Johnson, "they are clumsy and awkward swimmers, wriggling through the water like tadpoles, but as creepers and climbers they are without rival in the fish family. The mouth is small, but is surrounded by a broad, soft, rubberlike flap, very thin and flexible at the edges. It is a sucker mouth, and the entire mechanism is so perfectly adapted to the needs of the fish that it finds no difficulty in firmly attaching itself to any convenient object. It is this ability to make a quick anchorage that enables the fish to stay at home when nature seems bent upon sweeping the watercourses clear of everything movable. The flat sucker mouth is half of the mechanism; the other half is located on the belly. Under the skin of the ventral side, just behind a line joining the pectoral fins, there is a triangular bony plate to which are attached the ventral fins. The main anterior ribs of these fins are broad and flattened, and the flat surfaces are thickly studded with small, sharp teeth pointing backward.



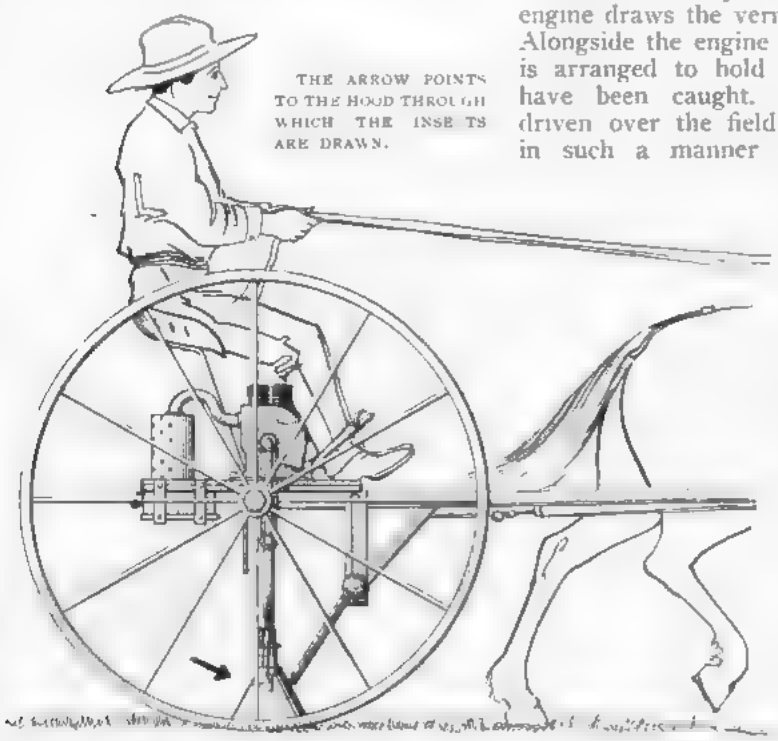
HOISTING MAGNET HOLDING CHAIN AND BALL SO RIGID THAT A MAN CAN CLIMB

"By means of the alternate action of the mouth and of this curious apparatus the fish is able to creep against a current that would baffle its efforts entirely if it relied alone upon its fins and tail"

Mr. Johnson tells of watching several of the fish climb out of a pot-hole twenty-two feet deep. It took them half an hour, ascending a foot or two at a time.

GATHERING PLANT DESTROYING INSECTS BY SUCTION.

MR. FARMER! You can now gather up the bugs and worms that infest your fields by an improved pneumatic process. Reed C. Bartlett of Waupaca, Wisconsin, has patented a machine to which you hitch your horse and drive about the infested territory. On the shafts is a cross bar which supports a small engine, preferably of the internal combustion type. This engine is provided with a shaft which extends through a fan casing. At the end of the shaft is a suction apparatus, and the suction caused by the pumping of the engine draws the vermin to their doom. Alongside the engine is a drawer which is arranged to hold the insects which have been caught. The machine is driven over the field under cultivation in such a manner that the growing plants pass through openings in a conical-shaped hood to which the arrow in the picture is pointing. When the engine is put in operation a strong suction is created and the insects which may be knocked off by the hood in its passage over the plants as well as those clinging to the plants are drawn up the shaft, from which they are discharged through the gooseneck into the perforated cylinder and then into the drawer for destruction.



THE ARROW POINTS TO THE HOOD THROUGH WHICH THE INSECTS ARE DRAWN.

SOME PECULIAR FREAKS OF NATURE.

THERE are about seventy elementary substances in nature which, by combining with each other, form the immense variety composing the earth and all therein, says *Railway and Locomotive Engineering*. All railway men are familiar with hearing coal called black diamonds, which is a crude truth, for the diamond is only charcoal crystallized; but there are a great many other things in nature that, though possessing widely different properties, are composed of equal quantities of the same elements.

The white of an egg and rattlesnake poison are formed of identically the same amounts of the same elements. The oil of roses and common coal-gas are each formed alike, both being composed of four atoms of hydrogen and four atoms of carbon.

All the hydrocarbons, known to science as a combination of sixteen atoms of hydrogen and ten atoms of carbon, are alike in their composition. To enumerate some: Oil of orange, lemon, cloves, ginger, and black pepper.

The suggested explanation of these peculiarities is that the atoms are placed differently toward one another in the molecules of the different substances.

WORM-SCREW GEAR AND OSCILLATING AXLE FOR MOTOR-CARS.

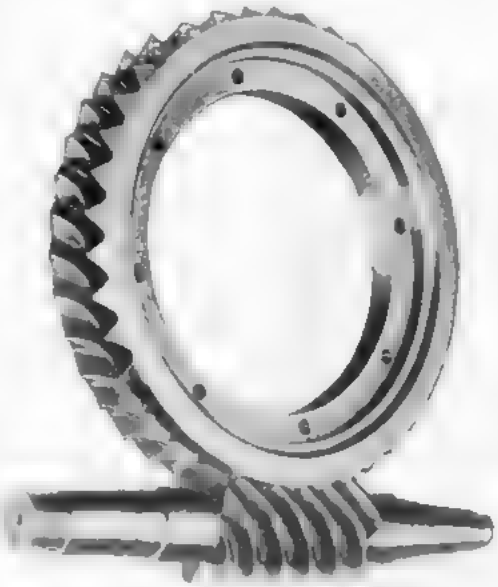
TWO of the very latest innovations in automobile truck construction are the worm-screw driving shaft and the oscillating axle. The worm-screw gear, shown in the upper picture, operates on a single steel shaft driven by the motors, and the car in which the gear is used is not equipped with sprockets or chains.

It is claimed that the worm-screw is much more serviceable because it is not subjected to the shocks which the chain-gear is obliged to withstand.

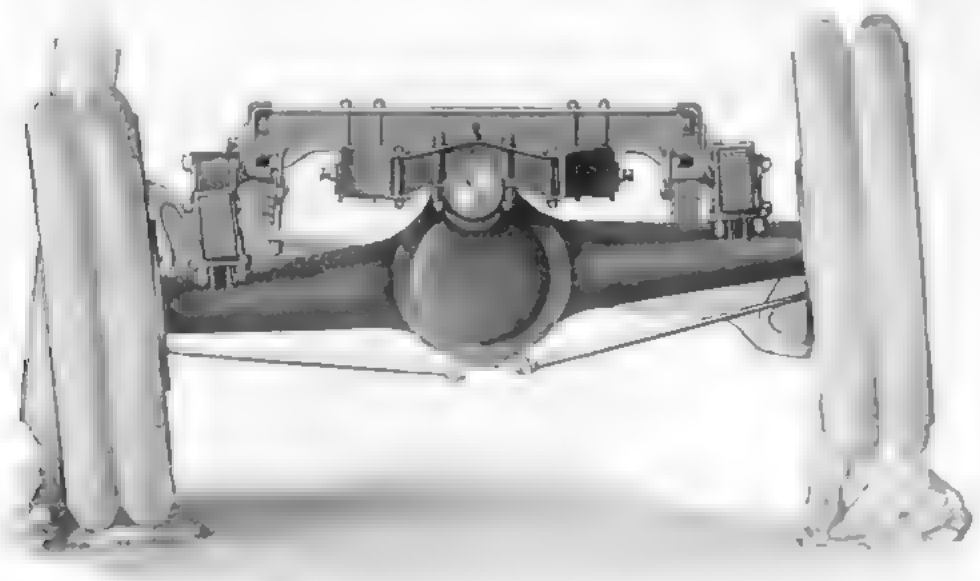
The principle of the oscillating axle is very clearly shown in the lower picture. Though the rear wheel on the right-hand side is passing over an obstruction of some size, it will be noted that the frame of the truck has maintained its normal position as effectively as if it was running on a smooth roadway.

The oscillation is further emphasized by the wheels on the left-hand side. The position of the front wheel is perfectly normal, showing that the car has not tipped at all.

Although development of the worm drive is practically at a standstill in England, where it first made its appearance, it is only just being taken up with seriousness by French builders, who in other matters generally have taken to such innovations with avidity and almost without the thorough investigation which invariably precedes British adoption of any new construction.



WORM SCREW GEAR NOW POPULAR IN EUROPE

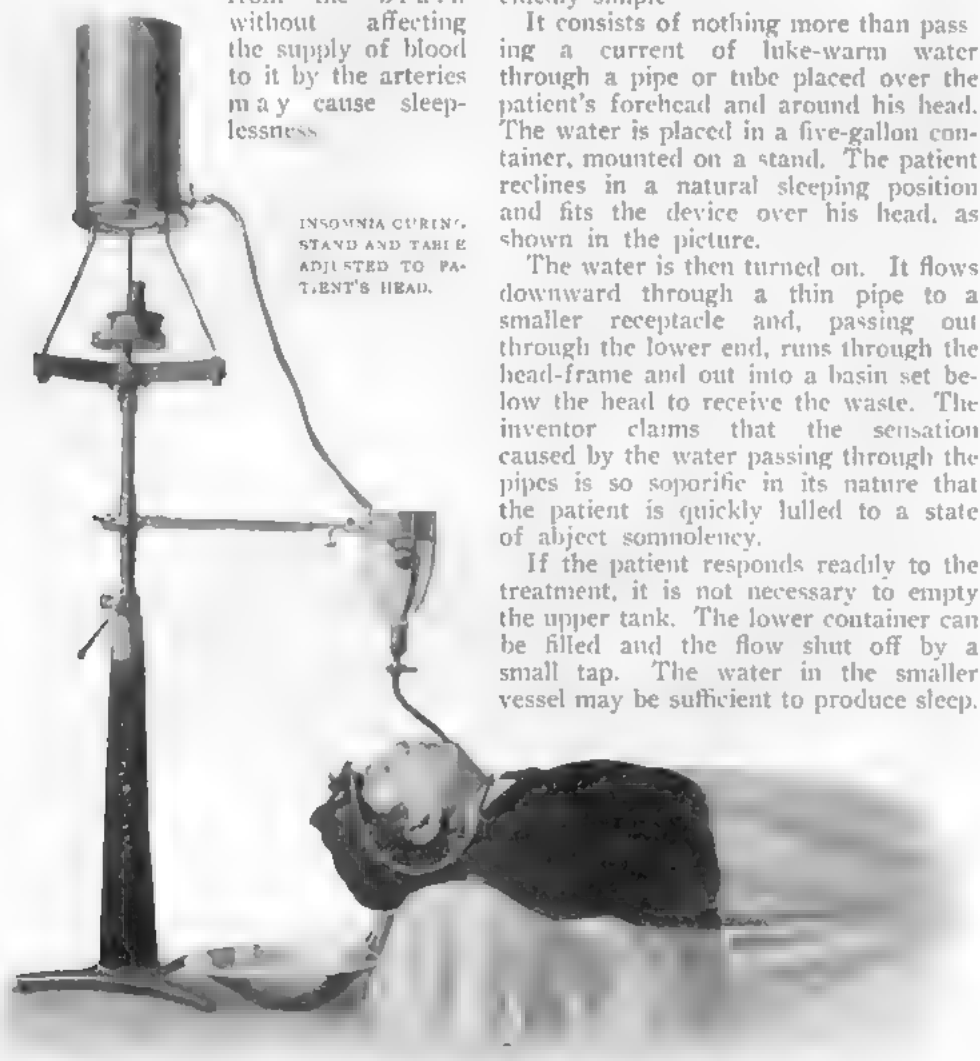


OSCILLATING AXLE TO PREVENT AUTOMOBILES FROM TIPPING WHEN PASSING OVER OBSTRUCTIONS.

CURING INSOMNIA WITH A STREAM OF WATER.

WAKEFULNESS during the time when one ought to be asleep is frequently a distressing condition, undermining the strength and incapacitating the person for active and efficient work. Insomnia or sleeplessness often afflicts those of active mental habits and lays the foundation of premature decay.

It is dangerous to induce sleep artificially by drugs, as the overworked brain may become the seat of permanent disease or pernicious habits may be formed. The posture of the body in bed may influence sleep. Thus such positions as impede the flow of blood from the brain without affecting the supply of blood to it by the arteries may cause sleeplessness.



INSOMNIA CURING STAND AND TABLE ADJUSTED TO PATIENT'S HEAD.

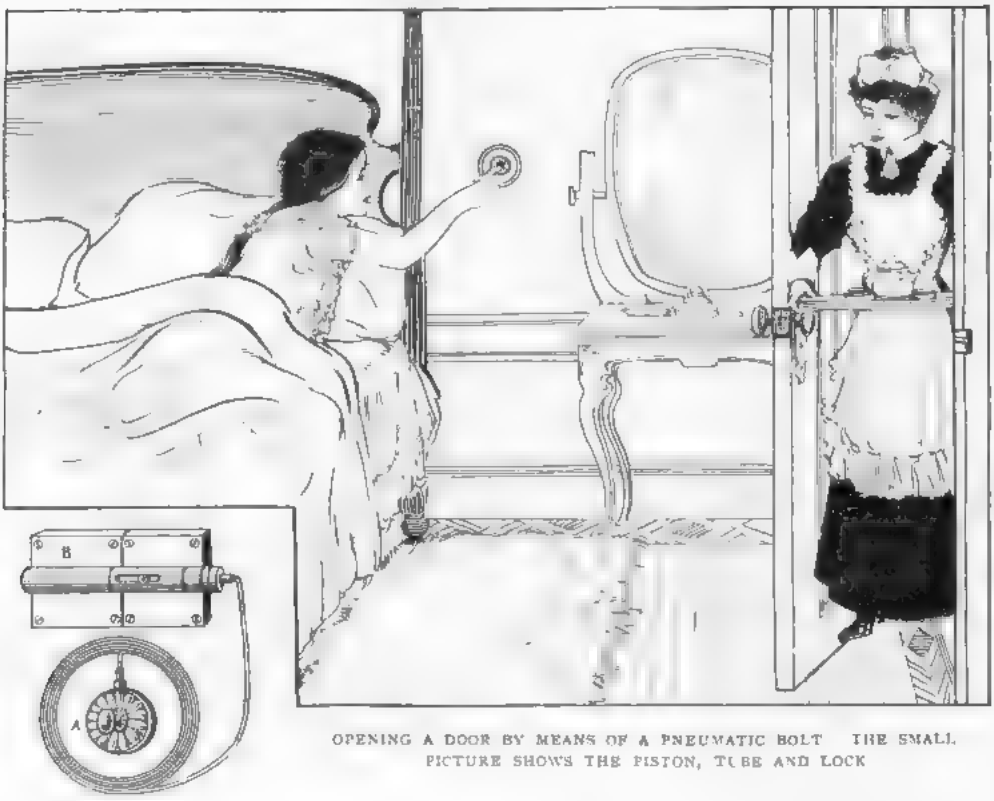
Sometimes in cases of insomnia from excessive mental work there is the distressing condition that sleep disappears when the person assumes a recumbent position in bed, although before lying down he felt drowsy. In such a case resting with the head high may produce the desired result. Insomnia may also be caused by various functional diseases, whereby the amount of blood in the brain is increased.

An English woman has invented an appliance which she says will serve as an effective cure for sleeplessness and chronic insomnia. Its principle is decidedly simple.

It consists of nothing more than passing a current of luke-warm water through a pipe or tube placed over the patient's forehead and around his head. The water is placed in a five-gallon container, mounted on a stand. The patient reclines in a natural sleeping position and fits the device over his head, as shown in the picture.

The water is then turned on. It flows downward through a thin pipe to a smaller receptacle and, passing out through the lower end, runs through the head-frame and out into a basin set below the head to receive the waste. The inventor claims that the sensation caused by the water passing through the pipes is so soporific in its nature that the patient is quickly lulled to a state of abject somnolency.

If the patient responds readily to the treatment, it is not necessary to empty the upper tank. The lower container can be filled and the flow shut off by a small tap. The water in the smaller vessel may be sufficient to produce sleep.



OPENING A DOOR BY MEANS OF A PNEUMATIC BOLT. THE SMALL PICTURE SHOWS THE PISTON, TUBE AND LOCK

DOOR-BOLT THAT WORKS BY AIR PRESSURE.

FROM France comes a device that should be welcomed by those who are invalids, those who are lazy, and, in short, all who do not relish the idea of jumping out of bed to admit a servant, or for any other reason. It is a pneumatic bolt to be used on doors. It is simple and practical. The button, or piston (A) is placed within easy reach of the bed. It forces the air through a metal or rubber tube, shown in the coil in the smaller picture. This action forces the air in the cylinder (B), and the bolt springs open. This device should appeal to busy men who seek the privacy of an office that must be free from intruders.

The door can be opened without the busy man leaving his desk

It may appeal, also, to those who dislike jumping out of bed on cold winter mornings

ARE YOU A HOUSEHOLD MECHANIC?

SOME of the greatest inventions originated in the household. The daily routine of the home suggests many things to save time and labor. Our patent records show that the busy housewife has given the world many of its most useful articles. Our Current Mechanics Department wants to get in touch with these practical inventions. Describe your invention in three hundred words or less, and send it to us with a drawing or photograph. Unless accompanied by stamps, manuscripts or drawings will not be returned. Address, Current Mechanics Department, The Frank A. Munsey Company, 175 Fifth Avenue, New York.

CUTTING FIGURES IN A SHEET OF STEEL BY THE HOT FLAME PRODUCED BY COMBINING OXYGEN WITH ACETYLENE GAS

CUTTING AND WELDING METALS WITH ACETYLENE GAS.

CUTTING through thick plates of steel and welding broken pieces of machinery into a perfect whole by means of oxy-acetylene gas is a pronounced success. Both are accomplished by combining the gas acetylene with oxygen from which the liquid derives its name. The combination produces a flame that is infinitely hotter than the electric arc.

When a sheet of steel is to be cut through it is first heated to an intense degree by the oxy-acetylene flame. When it is at the proper whiteness the acetylene gas is cut off and a thin stream of oxygen, under pressure, is directed at the glowing steel. As a result the steel actually catches fire and burns away, leaving a sharp, clean cut. So violent is this action that steel six inches thick can be cut at the rate of a foot every three minutes, with a width of cut, where the metal burns away, less than a quarter of an inch in width.

J. C. Reid, in an article in the *Railway Journal*, says:

"There is doubtless not a railroad official in the United States who has not heard about oxy-acetylene welding or who has not seen some of the work. They have read of its money and time saving qualities and of the efficiency of the welds, and yet to-day only a small per cent of the railroads are equipped with oxy-acetylene. The question naturally arises, 'Why are not all the shops equipped?'

"Oxy-acetylene welding is a trade within itself, the same as machinist, blacksmith, boilermaker, etc. Time and perseverance are needed to master the trade.

"The trouble at most places, when an oxy-acetylene plant is installed, is that perfect results are expected within a few days, and the fact that it takes time to learn is either entirely overlooked or greatly underestimated. In many cases the man who is assigned to operate the outfit is given a few days' coaching by some demonstrator and led to believe that he is a competent welder ready to

attempt any job after a little practise with the torch.

"The foremen are told of the many things that can be done with oxy-acetylene and they are generally eager to try it out. They often give the operator the most difficult job they can find, to give it, as they say, a thorough test. They will probably put him in a firebox and give him a patch to weld in, and, of course, he will make a failure.

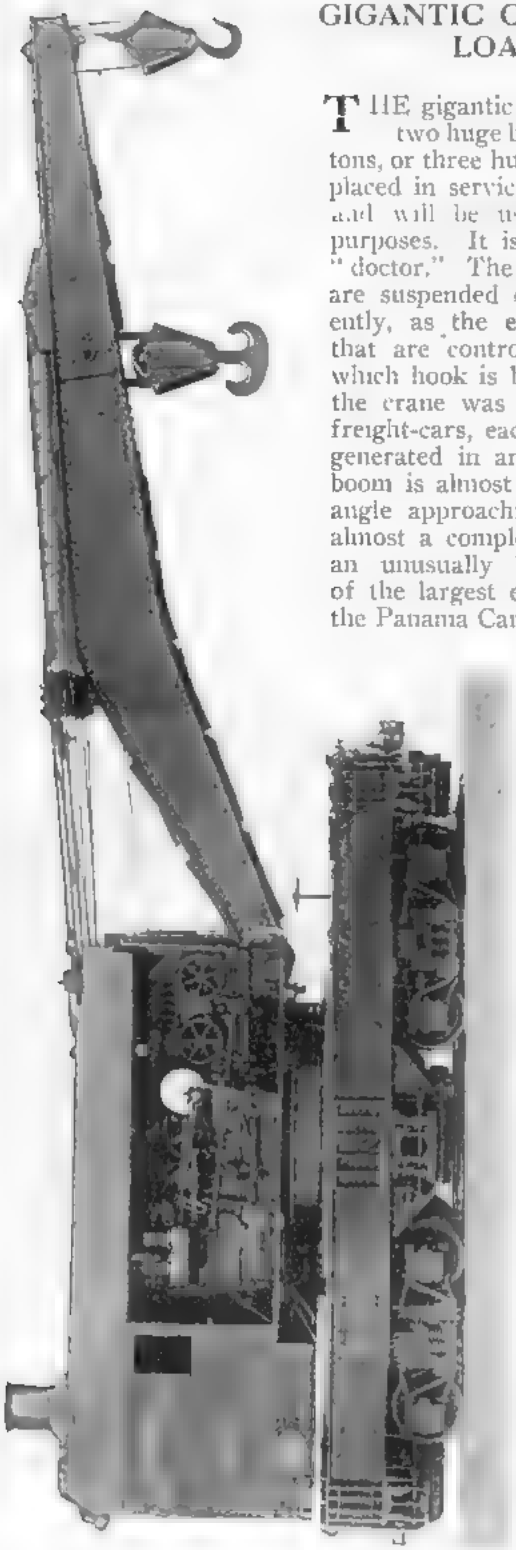
"The officials of the road, on the other hand, are anxious to know, and especially during the first few weeks, what progress is being made along this line. They will receive reports of many failures, and in this way will pronounce oxy-acetylene a 'failure.'

"If the man selected to be an operator is inexperienced, he should devote some time to small practise jobs, such as welding sheet-iron together when laid down in front of him. He should weld these strips and then break them if he can in the weld. If he succeeds in breaking them, he should examine them thoroughly and see exactly where his metal failed to unite, and then try another piece to see if he cannot do better.

"He should try welding cast iron in the same manner, and not until he has become successful on these test strips should he attempt any useful work. His first useful work should be very simple jobs. When he becomes efficient on simple jobs, he can gradually take on larger jobs. Later he can attempt simple patches, such as those with two free sides, where the expansion and contraction is easily handled.

"After the welder becomes efficient on work where he is not bothered by expansion and contraction, he still has a great deal to learn and will have many failures until he learns how to handle the expansion and contraction."

METAL OF THE THICKNESS SHOWN IN THIS PHOTOGRAPH CAN BE CUT THROUGH AT THE RATE OF A FOOT A MINUTE BY THE ACETYLENE PROCESS. IT WOULD TAKE A MAN OVER AN HOUR TO CUT A FOOT WITH A STEEL SAW



GIGANTIC CRANE BUILT TO CARRY TWO LOADS OF 75 TONS EACH.

THE gigantic crane shown in the photograph will carry two huge burdens aggregating one hundred and fifty tons, or three hundred thousand pounds. It has just been placed in service on the Norfolk and Western Railroad and will be used for heavy yard work and wrecking purposes. It is what railroad men popularly term the "doctor." The powerful hooks from which the burdens are suspended can be used simultaneously or independently, as the engine is provided with two cable drums that are controlled by one or two levers, according to which hook is being used. In a test made shortly before the crane was placed in actual service, it lifted two freight-cars, each loaded with sixty tons of coal. Steam, generated in an upright boiler, is the power. The steel boom is almost forty feet long. It can be raised to an angle approaching forty-five degrees and swung about in almost a complete circle. One hundred and fifty tons is an unusually large capacity for a steam crane. Some of the largest ever used were employed in excavating for the Panama Canal, but these monsters accommodated only one hundred tons.

364 TONS TO BREAK CABLE.

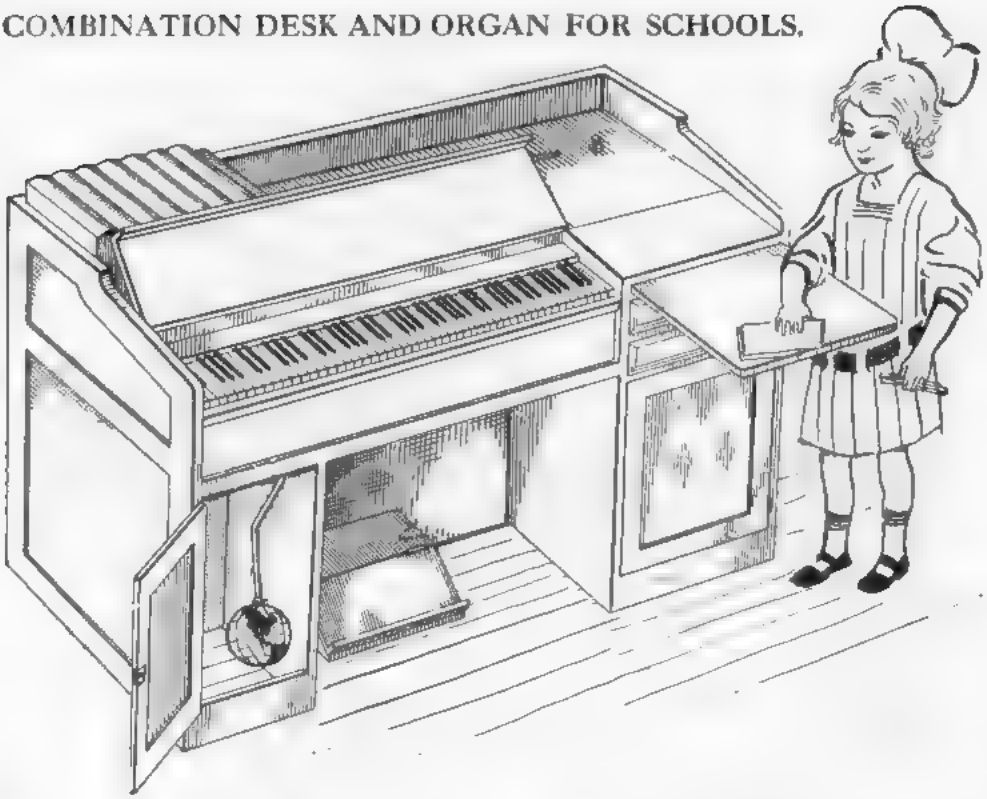
IT took a pull of 364 tons to break the largest hoisting cable in the world, when sections were tested in the 800,000 pound testing machine of the Fritz Engineering Laboratory at Lehigh University, South Bethlehem, Pennsylvania. Three tests were made, all highly satisfactory. A piece of the cable that had been in use for a year and a half withstood a pull of nearly 300 tons.

The construction of this cable is said to be without precedent in rope-making. It consists of six strands, each of nineteen wires, twisted around an independent wire rope center, this center having six strands of nineteen wires each, twisted around a hemp core. The finished cable is 7,810 feet long, and weighs 125,360 pounds. Cars with a capacity of 100,000 pounds are lowered down an inclined plane 5,800 feet long.

LATEST GEOGRAPHY.

RECENT explorations at the arctic and antarctic poles make necessary a revision of all geographies. They now state that water covers two thirds of the earth's surface, land being only one-third. The latest figures are: land, three-sevenths; water, four-sevenths.

COMBINATION DESK AND ORGAN FOR SCHOOLS.



MISS MINNIE ETHEL PUNTENNEY, of Oklahoma City, Oklahoma, has patented a combination organ, desk, globe, foot rest, and bell. While an organ seems to be an unusual thing in the school room, where the piano has been given the preference in musical instruments, there is no doubt that it will serve the purpose and supply all the music necessary. The inventor's object is to have all these necessary things in a compact form. The lid of the keyboard forms the top of the desk. The globe is mounted on the free end of the pivoted arm. It can be pulled out of its compartment on the top of the desk where it can be seen by the entire class-room. The upper part of the desk serves as a book-rest. The button shown in the upper right hand corner of the desk rings the bell. In country schools this device should prove of great value.

The inventor claims an economy of cost in the use of her desk. Such a desk would not only have the advantage of placing things necessary to a teacher near at hand, but would not be as expensive as if each part were independent.

SEND ALONG YOUR GOOD IDEAS.

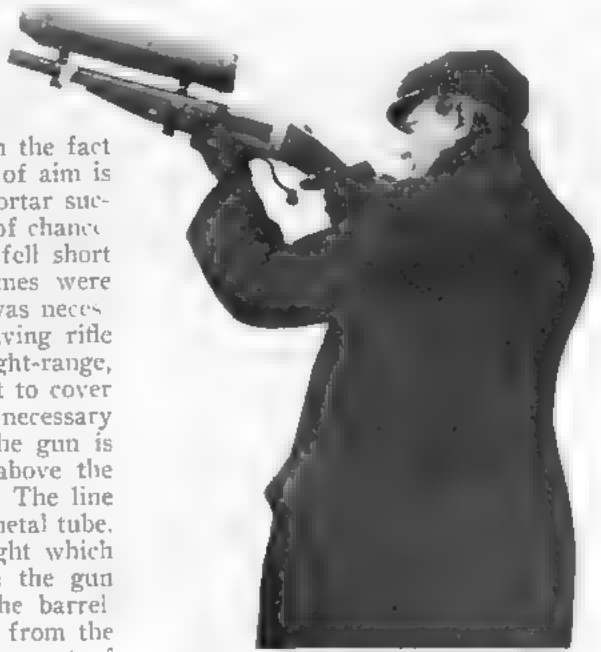
WE want ideas accompanied by illustrations for the Current Mechanics Department of this magazine. We want ideas that have something back of them. Ideas that are new and original—that may be worked up into something useful and practical. We want ideas that cover every phase of human endeavor. We will pay promptly for any that are acceptable. Unless accompanied by stamps, manuscripts or photographs will not be returned. Address, Current Mechanics Department, The Frank A. Munsey Company, 175 Fifth Avenue, New York.

TESTING THE NEW LIFE-SAVING RIFLE ON THE BRITISH COAST. IT HURLS THE PROJECTILE SEEN IN THE UPPER RIGHT HAND CORNER A DISTANCE OF TWO THOUSAND YARDS CARRYING THREE THOUSAND YARDS OF ROPE

ROPE-HURLING RIFLES FOR LIFE-SAVING SERVICE.

SPECIAL long-range rifles and new rockets of high power have just been introduced into the life saving service to supplant the old style mortar which has been in use for more than a century. The advantage of the life-saving rifle, which is shown in the illustration at the bottom of this page, lies in the fact that almost infallible accuracy of aim is possible, whereas, firing the mortar successfully was largely a matter of chance. With the mortar, lines often fell short of a disabled ship or sometimes were swept to one side because it was necessary to aim high. The life-saving rifle is equipped with a telescopic sight-range, which enables the man firing it to cover his mark carefully. It is not necessary to point the shot upward. The gun is aimed to send the line just above the ship's deck and is then fired. The line is fastened into one end of a metal tube. The other end contains a weight which rests against the cartridge in the gun when the tube is placed in the barrel. The explosion drives the tube from the barrel with great force, and the rest of the line, which is loosely coiled on the ground, is carried out over the water.

A number of these rifles are now used along the British coast. The type of new rocket is shown in the picture at



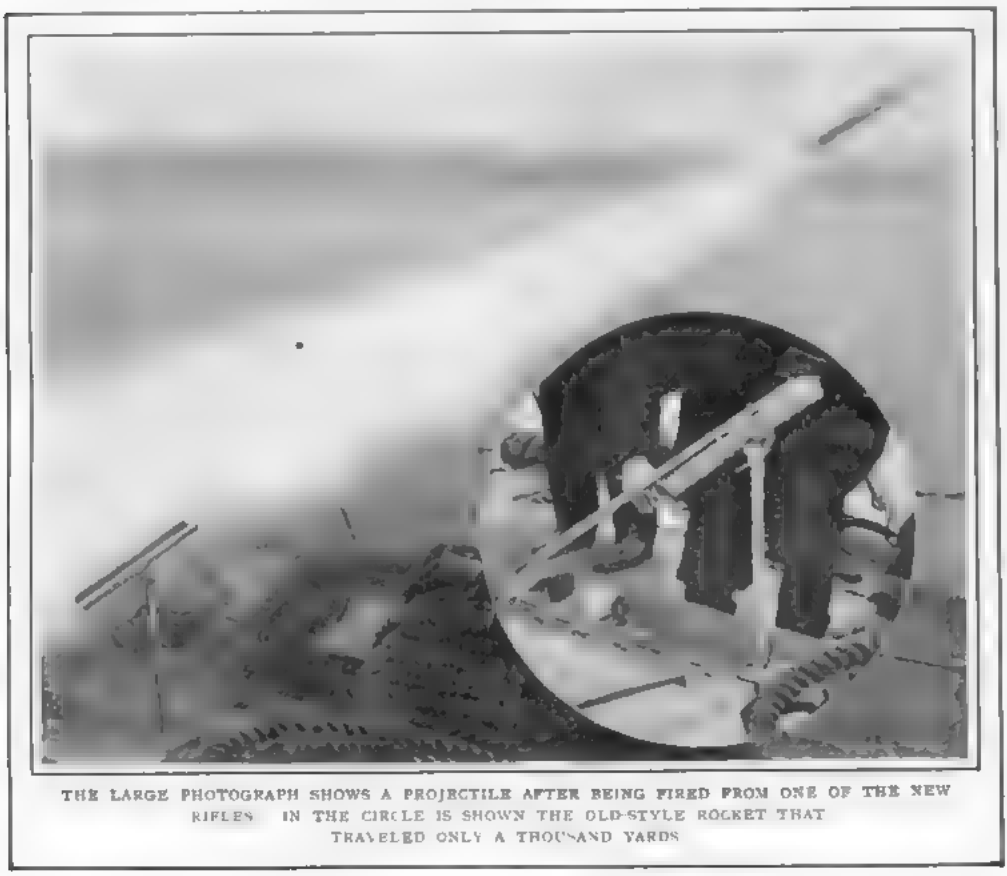
THE NEW LONG-RANGE LIFE-SAVING RIFLE, EQUIPPED WITH SIGHTING-RANGE TO SECURE ACCURACY OF AIM

the top of the opposite page. This rocket is new in the British life-saving service, and its increased size is very evident from a comparison with the lower picture in the circle. The larger rocket is mounted on a strong, portable metal frame. The manner in which the rope is attached to it is shown in the upper picture. While the smaller rockets carried a thousand yards of line, the new rocket has a range of two thousand yards. The superiority of the rifle and rocket over the mortar is best suggested, perhaps, when one considers that the mortar now in use is practically the same as that originally invented by Captain Maltby in 1807.

ADJUSTING A ROCKET AT THE PROPER ANGLE

In over one hundred years there have been but few improvements of the Maltby mortar

Since the establishment of a systematic life-saving service, the work has grown to a remarkable extent and has accomplished incalculable good. In this country alone three hundred and fifty stations have been instituted since 1873 at as many dangerous spots along our great expanse of coast



THE LARGE PHOTOGRAPH SHOWS A PROJECTILE AFTER BEING FIRED FROM ONE OF THE NEW RIFLES. IN THE CIRCLE IS SHOWN THE OLD-STYLE ROCKET THAT TRAVELED ONLY A THOUSAND YARDS

DUMPS TWELVE TONS OF COAL IN AN ENGINE'S TENDER IN FIFTY SECONDS.

WHEN the coal-man dumps your little ton of coal into the bin, sack by sack, taking the better part of a morning to accomplish the task, you can understand by easy comparison just what it means to pour twelve tons of anthracite into the tender of a locomotive in less than a minute.

A big system like the Rock Island, with several hundred locomotives at one division point, finds the coaling of these locomotives a very serious problem. Not only must the work be done with despatch, but cleanliness and waste are two important factors.

A new plant that has just been installed on the Rock Island at East Chicago, Illinois, shown in the illustration on this page, is one of the largest and most compact coaling stations in the country. It is worked on a practical principle, inasmuch as the big hopper is filled from flat cars as fast as the coal is dumped into a locomotive's tender. In the dumping operation the coal is poured into a receiving hopper between the elevator towers, and the lumps are broken and passed through the sifting grates to elevator buckets which are filled by gravity through a measuring leader.

The buckets are then hoisted to fill the main hopper by a ten horse-power motor. The buckets are so alternated that when one is at the top discharging coal the other is at the bottom receiving coal. By the arrangement of the guides on the hoist the power is automatically shut off while the lower bucket is being filled. The operator then reverses the electric switch, the empty bucket is lowered, and the full bucket is carried to the top. The operation is repeated until the lower receiving hopper is empty.

GIGANTIC COAL CHUTE WITH A CAPACITY FOR HANDLING ONE HUNDRED TONS AN HOUR

At the lower ends of the main hopper are spouts through which the coal, impelled by gravity, flows into the tenders. The spouts can be moved from side to side, thus distributing the coal evenly. The flow is controlled by a valve located at the upper end of the spout.

The valve is opened or closed by means of a rope. Two hundred tons are handled every day by this plant.

As all of our soft coal, and usually our Western lignite, are liable to catch fire by spontaneous combustion, there has been a tendency to adopt the steel chute, which is fire-proof.

UPPER PART OF THE 500-FOOT ELEVATOR SHAFT BUILT UP THE SIDE OF THE MOUNTAIN OVERLOOKING LAKE LUCERNE. TRAVELERS ARE TAKEN UP IN THE ELEVATOR SO AS TO GET AN "AEROPLANE" VIEW OF THE SURROUNDING COUNTRY

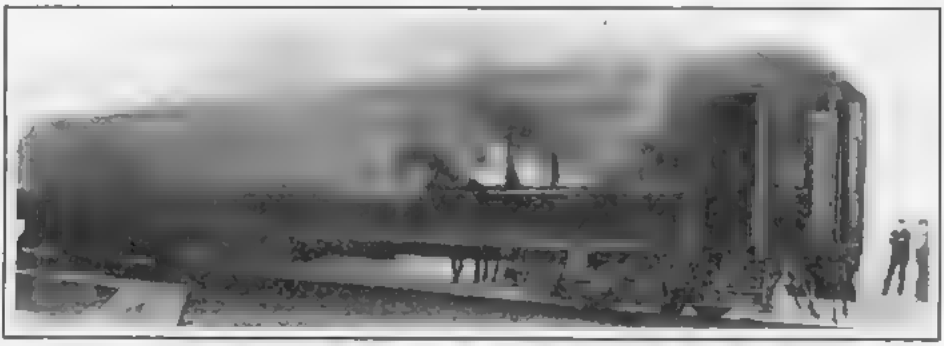
Photograph by Henry Ruschin, New York

AEROPLANE VIEW FROM ELEVATOR.

IN order that travelers to Lake Lucerne, in the Swiss Alps, may secure an aeroplane view of the scenery surrounding that famous body of water, an elevator has been erected by an American firm, from the base of a mountain bordering to its top, a height of 500 feet. The elevator is operated by cables, such as are used in any big hotel or skyscraper in the United States. The steel open-work gives the passenger a splendid view of the scenic beauties of the Swiss lake region, as the elevator ascends slowly through the shaft. At the top of the shaft a walk extends to the mountain.

DID YOU EVER INVENT ANYTHING?

IF you have, the Current Mechanics Department offers you an opportunity to bring your invention before the public. This is a rare chance for the inventor who thinks he cannot find a way to let the world know what he is doing. If you have an invention that seems to be practical, let us see it. Describe it in three hundred words or less and mail it with photograph, blue print, or original sketch. We will pay promptly for whatever we accept. Unless accompanied by stamps, manuscripts or drawings will not be returned. Address, Current Mechanics Department, The Frank A. Munsey Company, 175 Fifth Avenue, New York.

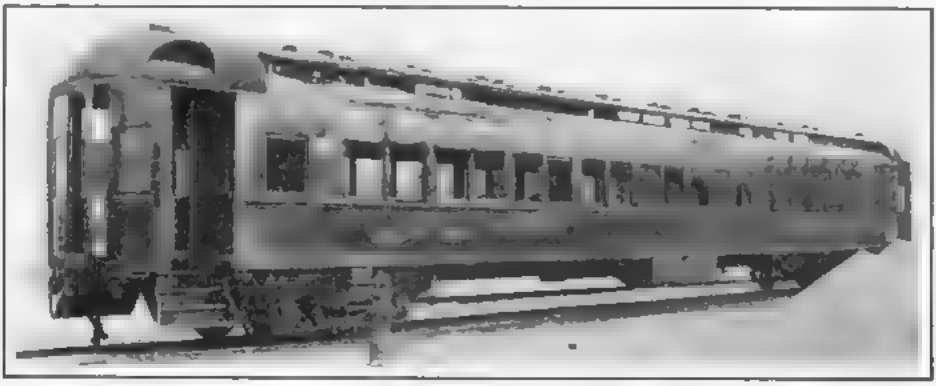


WHILE THE FIRE WAS BURNING AT ONE END OF THE PENNSYLVANIA RAILROAD'S ALL-STEEL PASSENGER COACH No. [illegible]

TESTING THE FIRE-PROOF QUALITY OF AN ALL-STEEL PASSENGER CAR.

IN order to establish the fire-proof value of all-steel passenger-cars over wooden cars, the Pennsylvania Railroad recently set fire to one of its new all-steel equipment—and when the fire had burned itself out one end of the interior of the car was only nominally damaged. The car selected for the test was used in the fast passenger service between New York and Philadelphia. A bale of excelsior and 150 pounds of kindling-wood were scattered about one end of the car. Over this a barrel of oil was poured and ignited. The windows of the car were thrown open to create as much draft as possible and the fire was allowed to burn out. Only the seats were destroyed and the varnish blistered. The fire did not reach the opposite end of the car. Pressed-steel cars can be repaired in any ordinary shop and by ordinary labor. In order to be able to press car parts, it is necessary to use a tough, soft steel which will bend up or collapse before it will break or tear. Open-hearth steel must always be used for this class of work. Rolled sections, however, are usually made of Bessemer steel, or steel of high carbon, and will not stand much bending or flanging.

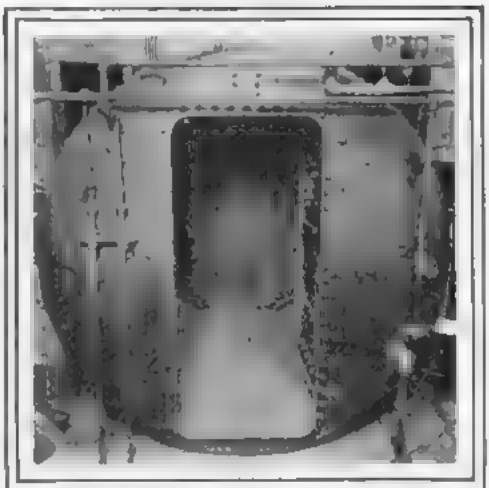
This becomes apparent in the event of a wreck, when repairs are attempted. Sills of rolled sections are difficult to straighten after they have been bent, and are apt to break. Thus, it is often necessary to renew parts instead of merely straightening or patching them, as would be possible in the case of pressed parts made of soft steel



HOW THE COACH LOOKED AFTER THE FIRE HAD BURNED ITSELF OUT

AIR CHAMBER TO CURE "BENDS."

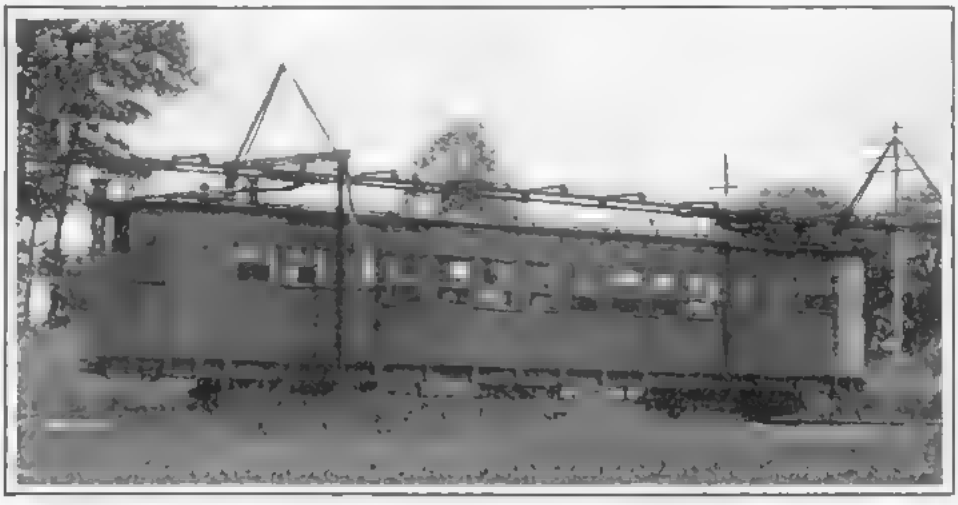
MEN working in caissons below the surface of a river, or engaged in other underground work, are exposed to low-pressure atmosphere and gases which, at a sufficient depth, cause a peculiar disease of the limbs called the "bends." This finally results in loss of breath and death. To immediately bring a man afflicted with "bends" to the surface and expose him to the higher pressure would cause a sudden change in his condition which might also result in instant death. An American has invented a means of avoiding this. It is shown in the illustration at the top of this page. It resembles a boiler. Pipes extend through its surface into the interior, and by the use of these pipes the pressure of the air in the chamber can be regulated. When a man is overcome he is placed inside the chamber, which is immediately closed and the pressure of the atmosphere within is so controlled that he can be gradually revived. If the man is not too seriously afflicted he can be resuscitated in fifteen or twenty minutes.



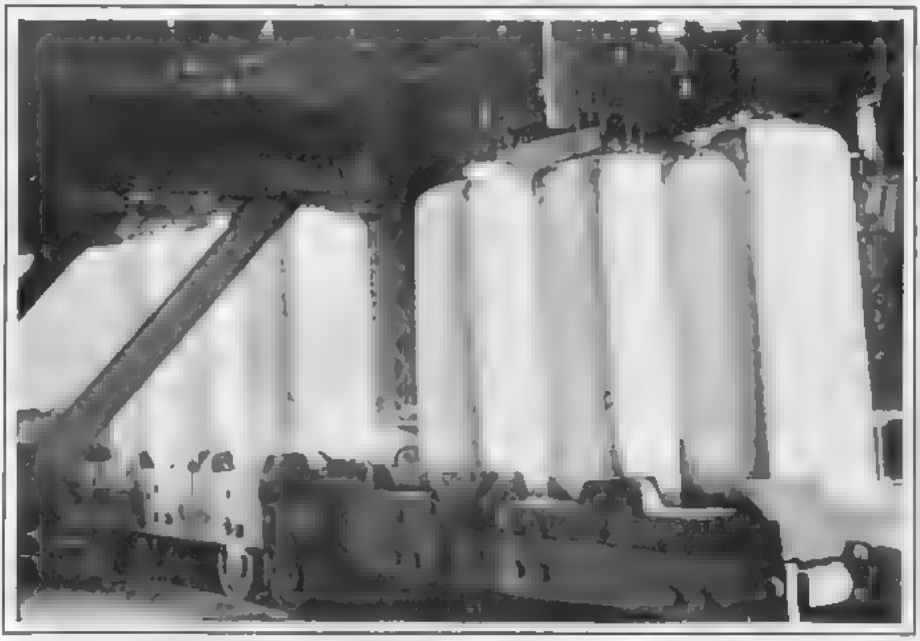
MEN WORKING AT A GREAT DEPTH UNDERGROUND, OR DIGGING TUNNELS UNDER RIVERS, FREQUENTLY GET AN ATTACK OF "BENDS," WHICH DOUBLES THEM UP SO THEY CANNOT BREATHE. THIS IS ONE OF THE AIR-CHAMBERS INTO WHICH A VICTIM IS HUSTLED FOR RECOVERY

AMERICA'S ONLY MONORAIL.

THE only mono-railroad in this country that has ever been operated profitably for real public service is located in New York City and extends from Bartow Station, on the New York, New Haven and Hartford Railroad, to City Island. It consists of an upper and lower rail, as is shown in the accompanying picture. The overhead rail serves to supply electricity by which the cars are propelled. The trucks are of two wheels and are flanged on both sides to keep them on the rail



ELECTRIC CAR USED ON AMERICA'S ONLY SUCCESSFUL MONO-RAILROAD, WHICH RUNS FROM BARTOW STATION TO CITY ISLAND, NEW YORK CITY, A DISTANCE OF A MILE AND A HALF



HAULING WHITE-HOT STEEL INGOTS TO BE ROLLED INTO RAILS. THE MILLS IN WHICH THE STEEL IS MADE ARE EQUIPPED WITH COMPLETE ELECTRIC RAILWAY SYSTEMS TO HANDLE AN OUTPUT OF 50,000 TONS A MONTH

Photograph by Brown Brothers, New York

WHITE-HOT STEEL READY TO BE MADE INTO RAILS.

EVERY big steel plant in America is equipped with a complete railway system for handling the tons of material manufactured every day. The accompanying illustration shows the huge white-hot ingots being hauled from the molds to the cooling-room. After the iron or pig iron has been converted into steel ingots, these are placed on metal flat cars and hauled to the cooling-room by a storage-battery locomotive. The bars weigh about five tons each, and when they come from the ladle in liquid form are heated to almost 1,500 degrees. One large steel plant will turn out over 50,000 tons of steel a month.

SHOCK-ABSORBING PLATFORM FOR CARS.

AN improved system of construction for protecting the ends of a railroad-car body in collisions and wrecks has been designed by a resident of Ohio. The construction is such that, in case of a severe shock, the platform and vestibule will collapse, forming a cushion space of almost eight feet between two cars before the car bodies come together.

In a train containing eight coaches this space would be more than fifty feet of cushion construction, or, it is claimed, sufficient to absorb the shock and consequent damage before the cars containing the passengers could be seriously disturbed. This result is accomplished by fastening extension platforms to the center sills of the car body with rivets in such a manner that these will shear when the car receives a shock of unusual severity. The steps, vestibule doors, and hood will collapse when the rivets shear.

The entire end of the car body is covered with a heavy steel plate which extends from the upper portion of the roof to the bottom of the end sill; this plate being provided for further strengthening the end of the car body, to hold the end posts in position, and to prevent parts of the vestibule from piercing the end of the car. The entire platform, vestibule, hood, and sill extensions may be attached to the car at any time.

FIG 1 STEEL PUSHER TAKING SIXTY-TON HOPPER UP INCLINE TO ELEVATOR

MARVELOUS MACHINERY BY WHICH THREE MEN DUMP SIXTY TONS OF COAL EVERY FOUR MINUTES.

BY means of a remarkable dumping elevator operated by the Delaware, Lackawanna and Western Railroad at Pier 5, Hoboken, New Jersey, three men can unload a steel hopper containing sixty tons of coal in the astonishing interval of only four minutes. The simplicity and tremendous power of this elevator is strikingly shown in the accompanying illustrations. The elevator is located about four hundred feet from the end of the long pier. Approaching it from either side are standard gage tracks

In figure 1 of the photographs (on this page) a loaded car is shown being pushed onto the elevator, for hoisting and tipping. The four wheeled steel pusher at the rear of the car furnishes the necessary power. The pusher is attached to a steel cable which shoves it to the top of the incline with the car ahead.

The cars are backed against the pusher at the bottom of the incline. When a car is properly on the elevator, a signal is given to the engineer sitting in the small house at the end of the boom. The other photographs are on pages 250 and 251. Figure 2 shows the elevator at the chute, starting to tip with its huge burden of car and coal aggregating a hundred tons. The elevator is tipped by steel cables passing over a drum near the engineer's house.

Figure 3 is a front view of the massive elevator showing the car as it begins to tip and spill the coal. Figure 4 shows the car at an acuter angle, and figure 5 shows it in a perpendicular position with the last of the coal running out.

Aside from the rattle of the coal as it sweeps down the metal chute and into the square funnel leading into the holds of the coal barges in the river below, the operation of the elevator is smooth and noiseless. In busy periods the elevator can dump 7,500 tons or 15,000,000 pounds of coal in an eight-hour day, which is an average of one car in a little less than four minutes. The elevator is operated by steam and electricity.

FIG 2.—THE CAR IS FAST IN THE DUMPING ELEVATOR. IT IS IN THE FIRST STAGE OF THE TIPPING

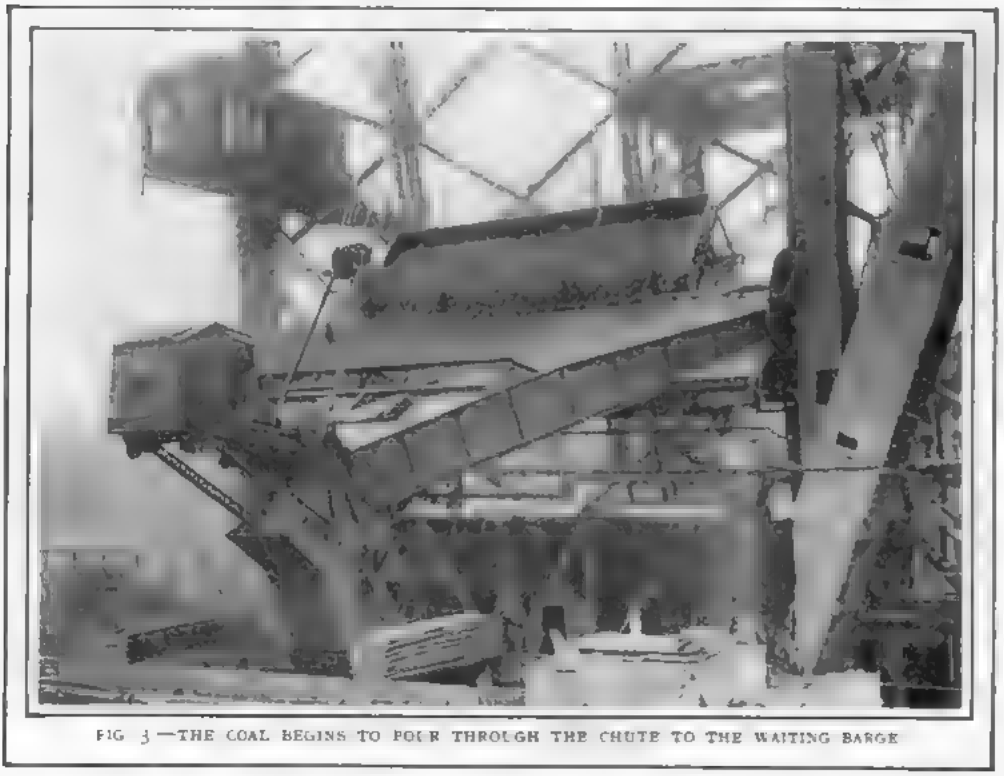


FIG 3.—THE COAL BEGINS TO POUR THROUGH THE CHUTE TO THE WAITING BARGE

FIG. 4.—THE SECOND STAGE OF THE DUMP. THE CAR IS HALF EMPTY.

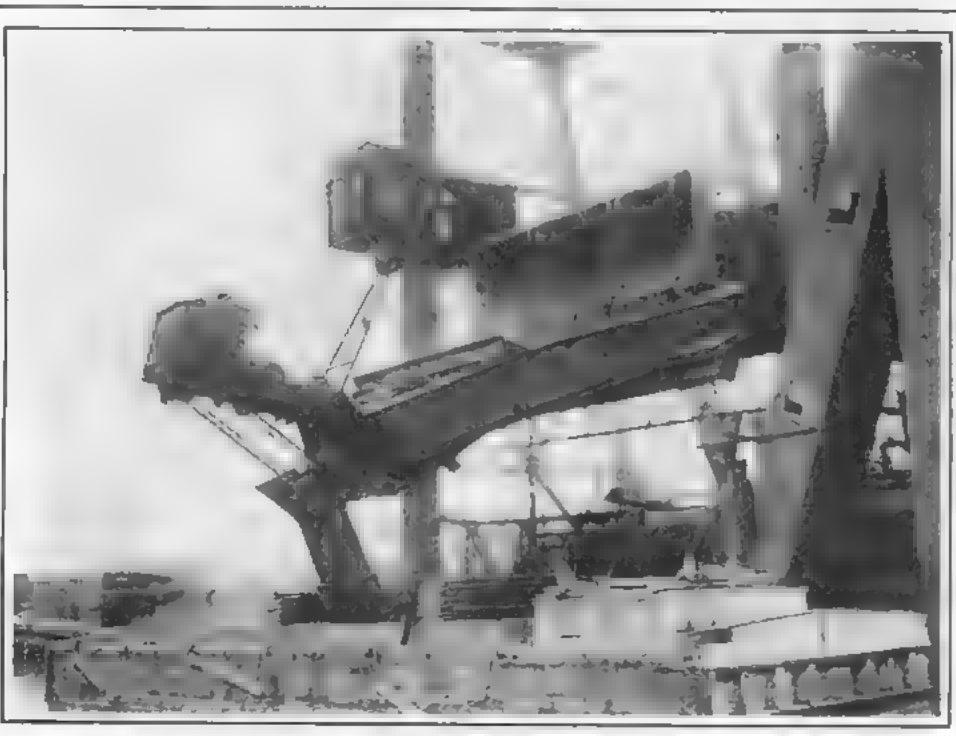


FIG. 5.—THE LAST OF THE SIXTY-TON LOAD, DUMPED IN EXACTLY FOUR MINUTES.

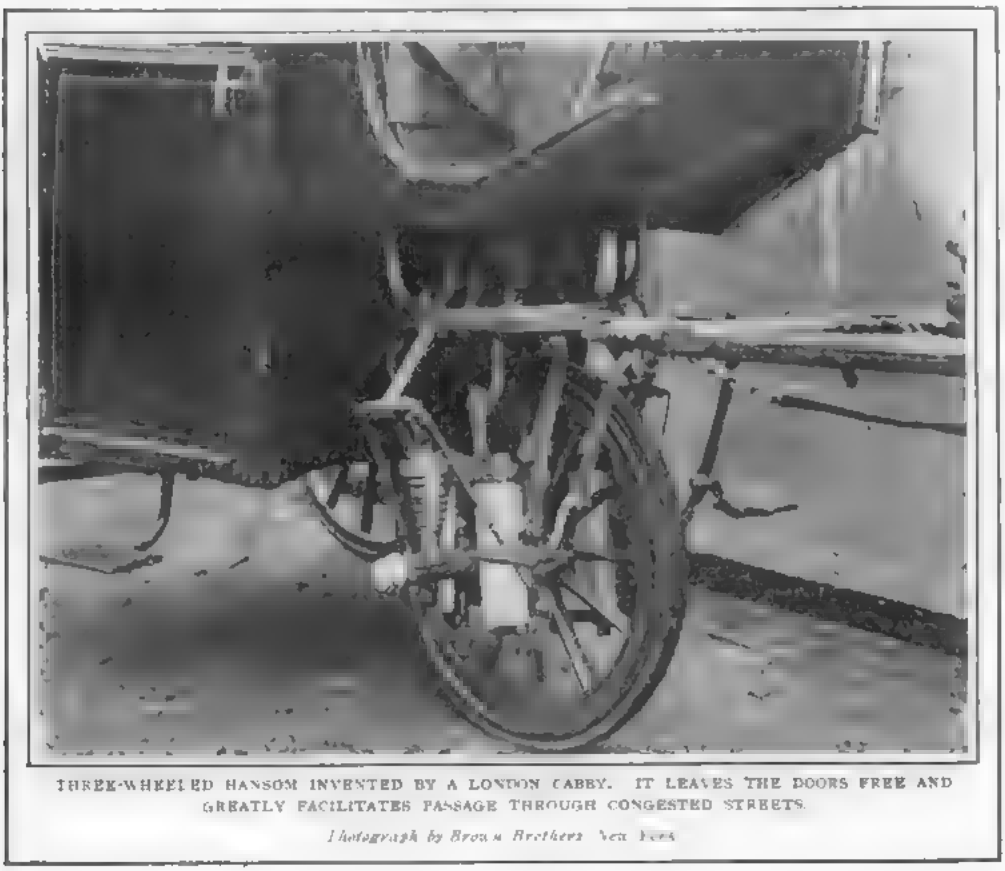
LONDON'S "THREE-WHEELER" INVENTED BY CABBY.

IF Sam Weller could come back to London now his esthetic sense would be outraged anew. What Sam would have to say about a freakish-looking three-wheeled cab which lately made its appearance in the British mother city would be at least picturesque

The inventor is a London cabman, J. Hoare by name. The advantages of the vehicle — which is patented by the inventor—are apparent, as shown in the accompanying picture. There is no muddy wheel to smirch a lady's gown as she goes in or out of the vehicle, and egress and ingress are facilitated for all the world alike. Another advantage of the vehicle is the ease with which it can be wedged through a jam, and backed up to the curb, without a projecting wheel to interfere with traffic.

Through his invention J. Hoare has become the big cabman of the world. His patents make it impossible for any other person to manufacture a three-wheeled cab. Most anybody in England can be pickle-maker or pants-maker to the king, if he can work a little political wire But there is only one man in all the world who can be three-wheeled cab-maker to his majesty, and that man is J maybe it's Joe—Hoare, the cabby who had an idea

The London cab followed the London coach, which made its appearance in London in 1623. There were then only twenty in the entire city, and they were kept at the hotels and had to be applied for when wanted. Ten years later an effort was made to put them out of business altogether. An appeal to King Charles I was made on the ground that they were unsightly and unnecessary However, the venture was unsuccessful The first stage-coach in London ran early in the seventeenth century. Its greatest speed was three or four miles an hour.



THREE-WHEELED HANSOM INVENTED BY A LONDON CABBY. IT LEAVES THE DOORS FREE AND GREATLY FACILITATES PASSAGE THROUGH CONGESTED STREETS.

Photograph by Brown Brothers New York

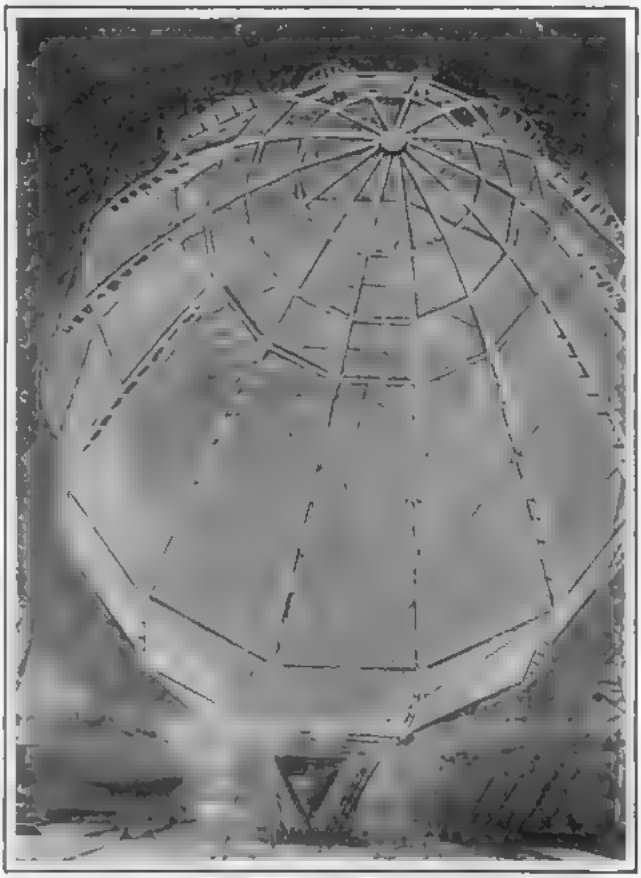
PHOTO-SCULPTURE WILL PREVENT LONG SITTINGS.

IT IS NO LONGER NECESSARY TO GIVE LONG AND WEARISOME SITTINGS TO A SCULPTOR WHEN YOU HAVE YOUR BUST MODELED. M. CARDIN, A PARISIAN, HIT UPON THIS INGENIOUS IDEA OF EMPLOYING SEVERAL CAMERAS SIMULTANEOUSLY.

HE SECURES INSTANTANEOUS VIEWS OF EVERY PART OF THE HEAD AND WORKS FROM THESE PHOTOGRAPHS. HE HAS POPULARIZED SCULPTURE.

SKELETON OF THE FRENCH WAR BALLOON "SPIESS."

GERMANY has always held the lead in dirigibles, thanks largely to the work of Count Zeppelin. But the very latest in this line is a vessel which is now having its try-out by the French military authorities. We present a view of the new "Spiess" dirigible from a photograph made before the cloth envelope of the air-ship was put on — a construction which European aviators and governments are watching with more than ordinary interest.



THE "SPIESS" AS SHE LOOKED BEFORE BEING ENCASED IN HER ENVELOPE OF CLOTH. SHE IS BUILT TO ATTAIN A SPEED OF FORTY MILES AN HOUR

The "Spiess" is named for its inventor, an Alsatian, who is a veteran air-man—who was, in fact, experimenting in aeronautics back in 1873, more than twenty years before Count Zeppelin began his work in this line. As an air-ship, the "Spiess" is remarkable not so much for its bigness or its speed or its horse-power as for its sane and thoroughly mechanical principles of construction. Not that the ship is a baby for size: its length of 360 feet and diameter of 44 feet would make it loom up quite respectably if tipped up on end alongside a thirty-story sky-scraper building.

Although the frame looks like steel or aluminum, it is square spruce-wood tubes, rigid, but light, making a stiff structure that will keep its shape if locally injured by an enemy's shot, and easy to repair without descending. The body contains twelve separate compartments, or balloons, full of gas, so that if one or more are punctured the ship can still stay aloft and be able to limp home. Its engines are expected to drive the vessel at about forty miles an hour. Along the bottom runs a triangular keel, or framework, containing the engines.

That the inventor thoroughly believes in this child of his brain is shown by the fact that he has paid to build it out of his own pocket.

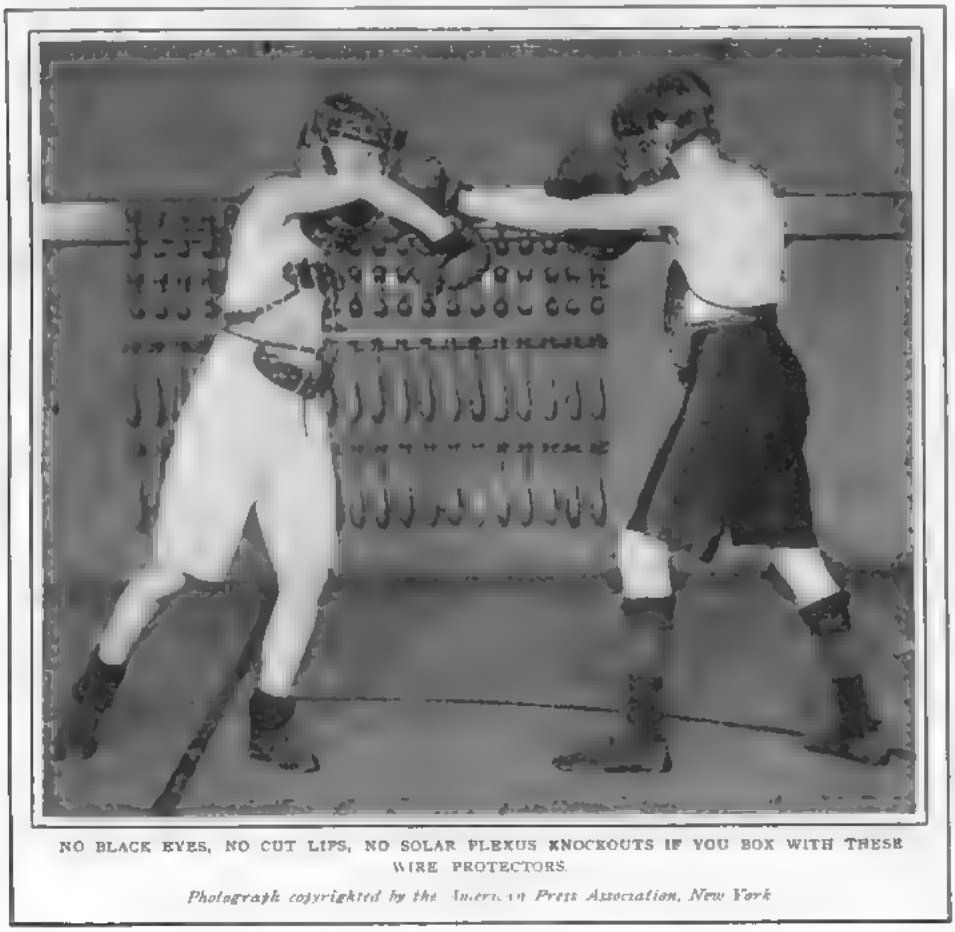
The London *Daily Mail* has announced the offer of a prize of $50,000 to the first person making a transatlantic flight in a hydro-aeroplane in 72 consecutive hours between any point in the United States, Canada, or Newfoundland, and any point in Great Britain or Ireland, in any direction. The contest is open to all nationalities.

BOX WITH ARMOR AND YOU CAN'T GET HURT.

TO enable amateur boxers to punch each other as hard and as frequently as they like without getting knocked out, wire protectors for the face and abdomen are being widely used, especially in athletic clubs and home gymnasiums. They resemble closely the masks used by baseball catchers and umpires. The fighting protectors are placed over the head in such a manner as to protect the jaw and other vulnerable spots where the knock-out can be landed. The solar plexus is similarly protected by a larger guard fastened around the waist. With such protectors boxers can fight as hard and fast as they please. The heavy gloves protect the fists from the wire guards and the guards prevent the force of the blow from having its effect. Sparring for the development of a fighting condition can hardly, it is logical, be quite effective when the men are obliged to hesitate in delivering a telling blow because of the chance of putting over a real punch.

The protector is the invention of Dr. Guy Otis Brewer, director of physical training in the public schools of Dover, New Jersey.

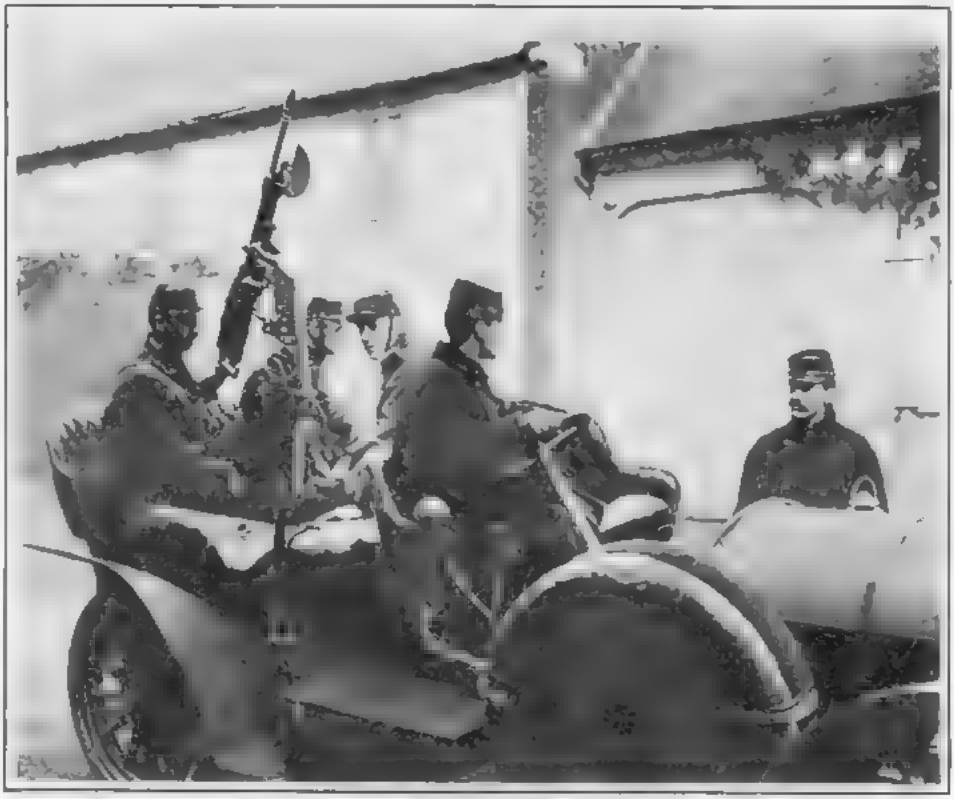
The frame of the protector consists of steel spring wire a little smaller than that used in baseball masks. The shock is absorbed by soft felt pads encircling two-thirds of the head and offsetting the head portion about two inches from the face. The lower portion rests on the chest and a similar felt pad offsets and absorbs shock there. The body part is hinged to the head part, and rests on the chest and abdomen.



NO BLACK EYES, NO CUT LIPS, NO SOLAR PLEXUS KNOCKOUTS IF YOU BOX WITH THESE WIRE PROTECTORS.

Photograph copyrighted by the American Press Association, New York

MIDGET ARTILLERY TO PEPPER AEROPLANES AND SUBMARINES IN WAR.



FRENCH GUN MOUNTED ON A MOTOR-CAR FOR SCURRYING OVER FIELDS. FRANCE EXPECTS TO PUNCTURE GERMAN AIR CRAFT WITH THIS BATTERY

Photograph by Paul Thompson New York

WITH the adaptation to the purposes of warfare of the aeroplane comes the necessity for devices for its destruction from the point menaced below. That it is quite possible to shoot and disable an aeroplane overhead was demonstrated during the recent siege of Adrianople. Military men have contended that such a thing is due more to luck than marksmanship, or the efficiency of any gun now in use.

It would appear that this element of chance and doubt is to be removed in future by recent improvements in guns of large caliber which can be accurately fired in a perpendicular position.

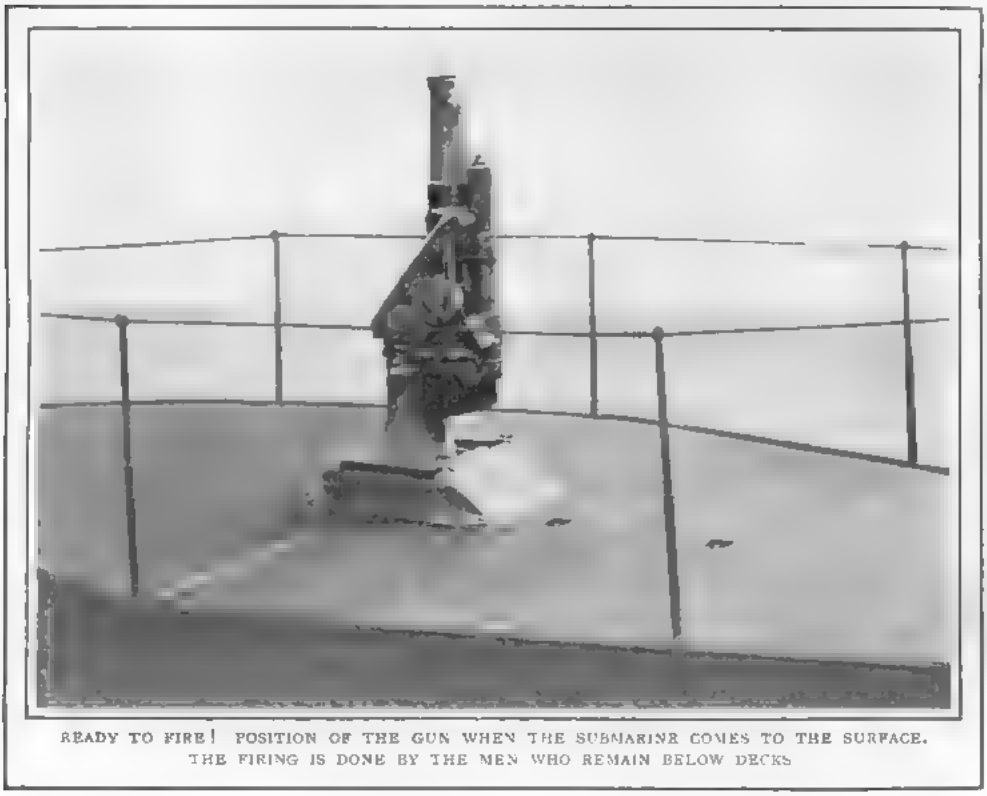
German tacticians have sweated blood over this question; the British army heads have been thrown into chills. But it would seem that, for Germany at least, the worry is over. Along comes Herr Krupp, that handy man, with a gun for submarine vessels which is designed for fighting aeroplanes and hydroplanes. It folds into the vessel's deck when not in use, as the picture shows

As for England, it has efficient guns of small caliber, but great force, which are mounted on automobiles for land use. These are the guns which are now lying in wait for the German air-ships which Englishmen see in their dreams, with orders to fire on all mysterious craft that come sailing over the channel

The submarine fitted with the chunky looking little gun shown in the picture is one of the latest of the many devices

KRUPP AEROPLANE GUN DISAPPEARING BELOW THE SUBMARINE'S DECK. WHEN THE COVER IS CLOSED, THE VESSEL IS READY TO GO UNDER WATER.

that are being tried out in Europe to slaughter the dangerous-looking warriors of the sky—the aeroplanes. However, this particular submarine is not only an enemy of the aeroplane, but it will sneak under a war-vessel with deadly result.



READY TO FIRE! POSITION OF THE GUN WHEN THE SUBMARINE COMES TO THE SURFACE. THE FIRING IS DONE BY THE MEN WHO REMAIN BELOW DECKS

RADIATOR IS HEATED BY LOCAL COMBUSTION.

ALCORN RECTOR, a gas engineer of New York City, has patented an invention to heat rooms and apartments individually and uniformly. It consists of utilizing artificial suction to operate a number of gas-radiators, all connected into one system. The artificial suction device is generally an exhaust fan placed in the cellar or attic, with exhaust-pipes leading to the various rooms of the house, and connecting with specially constructed gas-radiators in each room

BY MR. RECTOR'S INVENTION YOU ARE ABLE TO HEAT YOUR APARTMENT BY SIMPLY TURNING ON THE GAS. THE AIR OF THE ROOM IS USED FOR THE COMBUSTION, NEW AIR BEING SUPPLIED BY REGULAR VENTILATION

These exhaust pipes act as chimneys, drawing away from each radiator all the odors and fumes of burned gases, and also drawing into the radiator from the room a certain amount of air for the purpose of combustion. This air is drawn from the room into the radiator, from the radiator into the exhaust-pipe, and from the exhaust-pipe into the open, or out of doors

As this air passes through the radiator it is mixed with gas which is burned in a closed combustion-chamber. The resulting combustion products are then drawn through the coils of the radiator until all the heat has been radiated into the room and the products have been reduced to room temperature, when they are exhausted out of the room

All heat is left in the room and every disagreeable odor is removed. No water or steam is used in the radiator, the sole heating medium being the hot products of combustion.

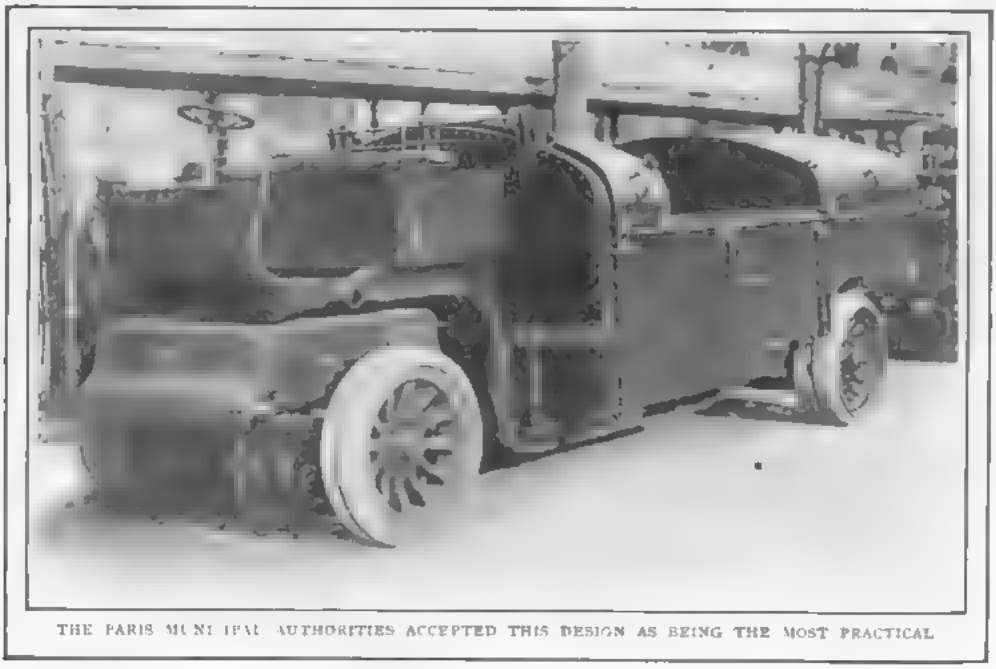
In the mean time another process is going on The air, withdrawn from the room for the purpose of combustion in the radiator, is necessarily replaced by fresh air passing into the room from the outside through cracks and crevices of windows and doors This ventilation is going on all the time, because the exhaust apparatus is running all the time, whether the gas is burning in the radiators or not.

The entire system may be started and stopped at a moment's notice by simply pushing a button.

COVERED MOTOR TRUCK ADOPTED BY THE NEW YORK BOARD OF HEALTH

AMERICAN AND FRENCH SANITARY GARBAGE MOTORS.

SANITATION in cities is one of the foremost problems of the world, and always has been. And since we have come to know so much about germs and lurking dangers in what our fathers simply regarded as harmless household refuse, all of us have our qualms when we meet an open ash-cart trailing its white menace. So there is great comfort in knowing that, in New York at least, the open ash-cart is giving place to a modern machine which moves silently, dustlessly, safely. The picture of one of these dustless ash-wagons is shown here. It is the invention of a convict, now free, who is making a fortune out of it. It can be loaded without dust, and dumped by a touch from the driver's seat. The other picture shows a Paris dust-cart which, compared to the New York ash-automobile, looks like an engine of war.



THE PARIS MUNICIPAL AUTHORITIES ACCEPTED THIS DESIGN AS BEING THE MOST PRACTICAL

HOW FRANCE AND GERMANY ARE PREPARING FOR WAR IN THE SKY.

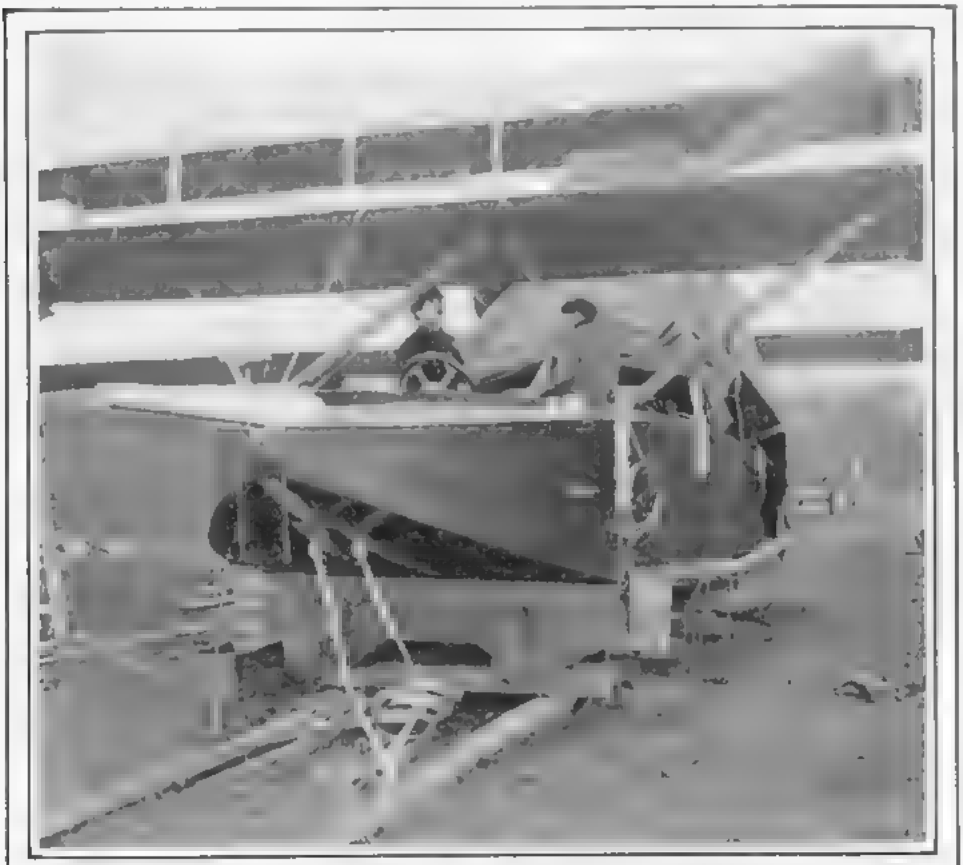
ALL nations have recognized the place of the aeroplane and hydroplane in warfare, but perhaps no nation has made such great strides in the development and adaptation of these craft to military uses as France and Germany.

Herewith are shown two pictures of French hydroplanes. Both of them are characteristic of the practical standard to which the French mechanics have brought them.

That the French are thoroughly in earnest with these machines, and that they have become a fixed part of that nation's armament, is evidenced by the preparations which have been made for transporting them in the field.

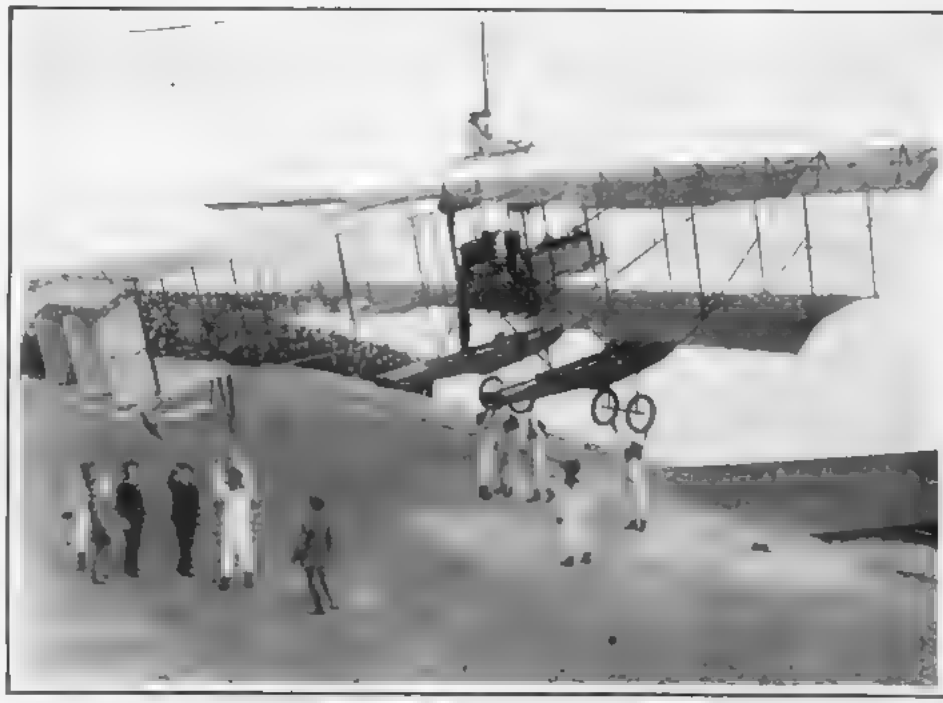
The armored case pictured here is proof against ordinary shot. In its thick sides the delicate engines of the planes are safe from the enemies' fire. Mounted upon an automobile truck, which is also armored, the hydro or aeroplane can be carried with a moving army, slipped from its protecting case in a few minutes' time, and launched into the air.

According to *Aircraft*, Germany will spare no expense to build up her air fleet to the fullest extent. The latest reports from Germany state that the immense sum of $37,500,000 will be spent during the next five years on the German air fleet — $25,000,000 for the army and



THIS PHOTOGRAPH SHOWS WHAT THE FRENCH GOVERNMENT BELIEVES TO BE THE MOST PRACTICAL TYPE OF HYDROPLANE. IT IS REALLY A FLAT BOTTOM BOAT SUSPENDED FROM A MONOPLANE

Photograph by Paul Thompson New York.



HERE IS THE GERMAN TYPE OF HYDROPLANE—A BIPLANE WITH ARMORED BODY FOR OPERATOR AND GUNNERS—FROM THE BODY OF WHICH IS SUSPENDED TWO SMALL BOATS. THE GERMAN GOVERNMENT HAS VOTED TO SPEND $37 500.000 DURING THE NEXT FIVE YEARS ON ITS AIR FLEET

Photograph by Paul Thompson, New York

$12,500,000 for the navy. Adding this to the $28,000,000 spent by the German government during the past five years makes a grand total of $65,000,000 for the German air fleet altogether.

Aircraft recently offered a recommendation to Congress to appropriate $10,000,000 for an American air fleet. There were some narrow-gage aeronautical people in this country who thought this was asking Uncle Sam to put up too much.

Well! In the face of what the Germans have already done, and are now doing and are making preparations to do, the sum of $10,000,000 would be rather a "one horse" appropriation for Congress to make for an American air fleet, after all.

That was a very interesting little excursion into France recently by the new Zeppelin IV, in which the German, after demonstrating his capacity for high flying by ascending to an altitude of 9,500 feet, landed squarely and with exceptional accuracy in the very heart of the French Military Grounds at Luneville. Before the excited Frenchmen had time to grasp the full significance of the proceeding or to thoroughly inspect the wonderful air visitor, the stolid German politely took to the air again and passed over the boundary-line as though it never existed.

The latest word from France is that she will build nine large 20,000 cubic-meter dirigibles at once.

The Zeppelin air-ship now insures new aerial tactics that make Germany positive of her ability to crush England's superior naval fleet, says T. R. MacMechen in *Aircraft*. General von Bernhardi, the foremost living German authority on military science, has already announced that the Zeppelins are of "supreme importance for winning the 'freedom of the sea.'"

Captain von Pustau, another German military authority, goes further: "England's otherwise all mighty fleet is now powerless against our Zeppelins and Schuette-Lanz rigid air-ships. England

has nothing to oppose their attack. Great Britain will never be allowed to impose a 16 to 10 ratio on Germany in the air, as she has done on the water. It would be a false elementary principle of strategy if we permitted any foreign power to overtake us in the race for the mastery of the air. That is the psychology of our aerial program."

Germany's program is to command the sea from the air If it can be demonstrated that her air ships can command the situation in a sea fight, then Germany's new tactics cannot be much longer ignored by the navy of the United States. Admitting for the moment that the Zeppelin air-ship is all-powerful, let us analyze how this would affect naval warfare

In naval warfare, scouting from the air has a much greater importance than in land war. It is absolutely vital because sea fleets cannot be disguised. It is not possible to hide from the enemy. An inferior fleet, when assisted by air-craft, should crush a superior fleet that is not aided by air-craft for the reason that the superior fleet will never get sight of its antagonist. The inferior fleet will always hide below the horizon, while its air-scouts will not only direct it where to move to escape the eye of the enemy, but will show which side to attack.

WAR AEROPLANE BEING SHIPPED IN AN ARMORED CASE THE AEROPLANE IS SO DESIGNED THAT IT WILL FOLD UP AND FIT IN THE CASE THE FURTHER SIDE OF THE MOTOR IS PROTECTED WITH A SHEET OF SOLID STEEL

Photograph by Paul Thompson New York

CURIOSITIES CAUGHT BY THE CAMERA

IF you are a camera fiend here is a chance for you to sell your photographs and make your camera a paying investment. We want odd, unusual, and curious photographs of all sorts; photographs that are interesting because they are out of the ordinary. Submit whatever pictures of this description you take anywhere. Unless accompanied by stamps, photographs will not be returned. Address, Current Mechanics Department, The Frank A. Munsey Company, 175 Fifth Avenue, New York.

SAFEGUARDING LIFE IN THE "HARD COAL" MINES.

DISASTERS in the soft coal mines of the United States had so aroused public sympathy, when Congress assembled toward the end of the year 1909, that there was a strong demand for legislation to promote the cause of safety. The outcome of this demand was the law creating the Bureau of Mines. The principal purpose of this bureau is to bring about improvements in mining conditions that will tend to decrease the risk of death and injury.

The first step was to investigate the methods most successful in Europe and America; and nothing proved more useful to the government experts than the study of what has been done to safeguard life in the anthracite mines—the "hard coal" mines—of northeastern Pennsylvania. There, where the entire anthracite production of the United States is concentrated, the protective measures have developed steadily, for a century, into the elaborate system of to-day. Ventilation, inspection, the strength of hoists, the operation of the underground railroads, rescue apparatus, first-aid-to-the-injured corps—all the elements entering into the problem have received the attention of the mining officials.

In this connection one of the most remarkable pieces of apparatus is used by the Lehigh Valley Coal Company—the oxygen helmet invented by a German named Draeger. The entire outfit, consisting of the helmet, oxygen-tank, and potash cartridge carried on the back, and the breathing bag carried on the chest, weighs only thirty-six pounds.

The helmet is of leather, with a window of mica, because glass would muffle the sound of the wearer's voice and would crack, when hot, if struck by a stream of cold water.

Mica is also cooler for the face and not so likely to exude moisture which would cloud its surface and obstruct the vision. A long leather hood hangs down behind to protect the neck and keep water from trickling down the back. A metal guard in front of the mica window protects it from breakage by a chance blow, and a curved piece of metal also protects and stiffens the top of the helmet.

AIR TIGHT HELMET REDUCING VALVE AND BREATHING BAG AS WORN BY THE MEN WHO BRAVE THE DANGEROUS FIRES AND GASES IN MINE RESCUE WORK IT CONTAINS SUFFICIENT OXYGEN TO LAST THE WEARER TWO HOURS

Photograph by Edwin Levick, New York

After it is adjusted on the head, a pneumatic cushion inside is inflated until it is perfectly air-tight around the face by means of a small rubber bulb attached to the front within easy reach. The air is retained in the cushion by means of a check-valve between it and the bulb.

Being thus hermetically enclosed, this is how the wearer breathes: The oxygen tank is charged to a pressure of 150 atmospheres, which is equivalent to a pressure of 2,205 pounds to the square

inch. This is sufficient oxygen to last the wearer for two hours

When the valve within easy reach at the bottom of the oxygen tank is turned on the oxygen is propelled by its own pressure through a reducing-valve with an injector by way of a tube to the breathing-bag, which is lined with rubber and divided into halves.

AN ENEMY OF FIRE INTRODUCED IN RECENT YEARS IN THE ANTHRACITE FIELDS, IS THE CHEMICAL ENGINE. IT IS MOUNTED ON A TRUCK PROVIDED WITH WHEELS WHICH ENABLE IT TO RUN UPON THE MINE TRACKS. AS THESE TRACKS VARY WIDELY IN GAGE, THE TRUCK IS SO CONSTRUCTED THAT THE WHEELS CAN BE MOVED TO FIT ANY GAGE. ONCE IN THE MINE, THE ENGINE MAY BE TRANSPORTED BY ELECTRICITY, COMPRESSED AIR, OR MULES.

The reducing valve reduces the pressure to 75 pounds to the square inch, and it is still further reduced by expansion to 14.7 pounds per square inch, which is the normal pressure of one atmosphere

The oxygen passes from the breathing bag, which acts as a sort of artificial lung, to the helmet, where it is inhaled and exhaled by the wearer. When it is inhaled it consists of 80 parts nitrogen and 20 parts oxygen. The exhalation consists of 80 parts nitrogen, 16 parts oxygen, and 4 parts carbon dioxid, or "black damp," as it is familiarly known to the mine workers, formed by the impurities from the lungs.

It then passes into the left half of the breathing-bag. This is accomplished by means of automatic check-valves in the connections to and from the helmet which are operated by the inhalation and exhalation of the wearer.

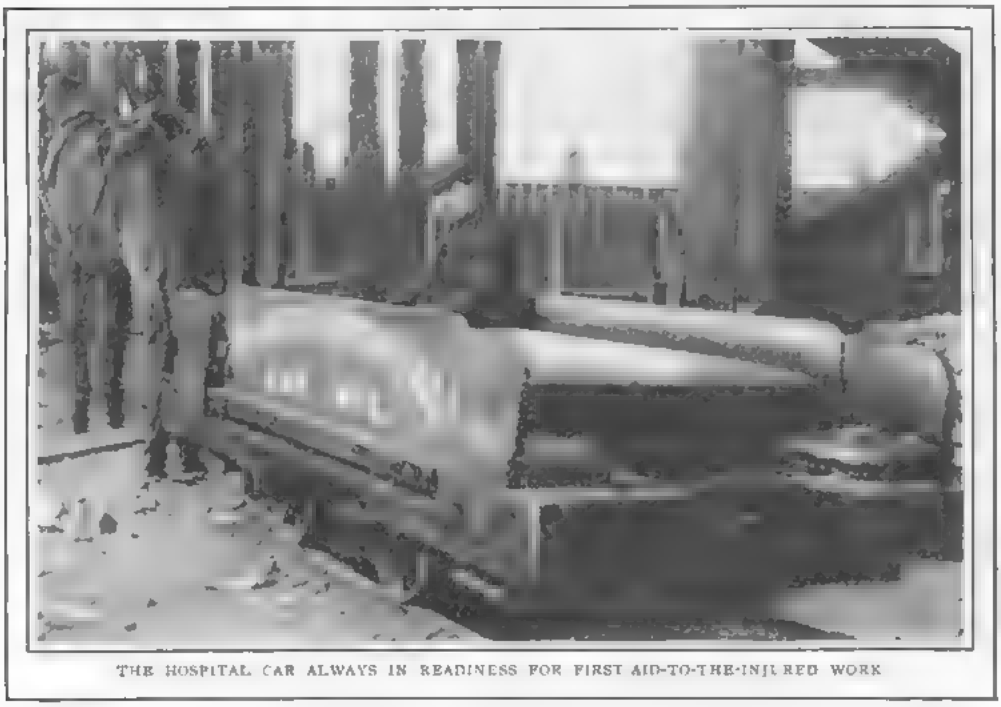
From the breathing bag the exhalation goes into the potash cartridge, which absorbs the moisture from the mouth and the carbon dioxid, thence through a tin cooler carried between the oxygen cylinder and the cartridge. The vacuum created by the injector draws the air into the circuit again.

The accessories of this device are very ingenious. A sponge carried on a spring within the helmet enables the wearer to clean the mica window and wipe the perspiration from his face

FULLY EQUIPPED FIRST-AID CORPS READY TO DASH INTO A BURNING MINE OR A ' POCKET OF GAS

An air-vent beneath the chin can be left open until he is ready to turn on the oxygen. The electric lamp used with these helmets in gaseous places will give light for twelve hours. Each outfit has a wrench attached for removing and replacing the oxygen cylinders when necessary.

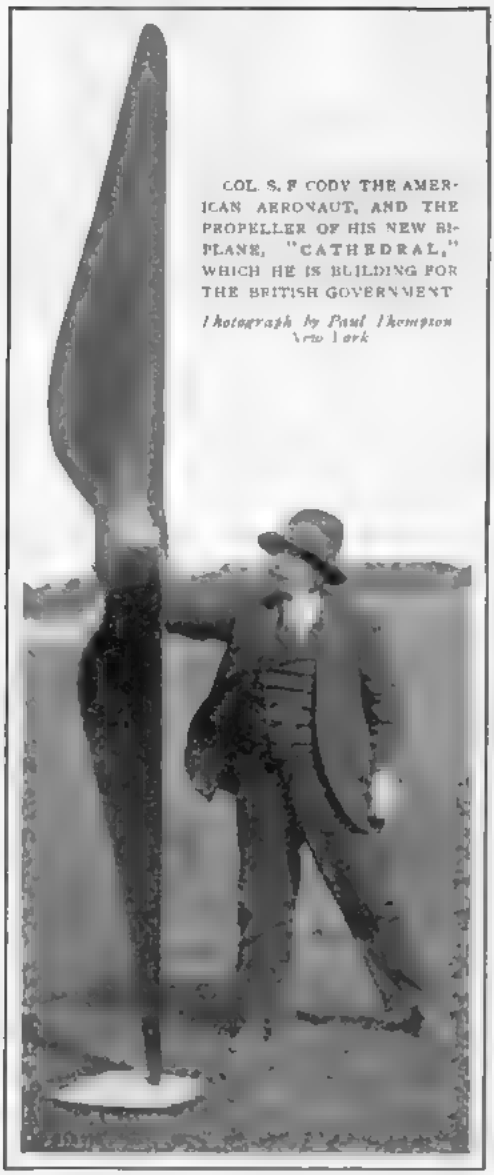
Finally an escape-valve in the front of the breathing-bag enables the wearer to release some of the oxygen when he is breathing too slowly and the bag gets too full. A man breathes more air when working hard and excited than when he is idle, and some provision had to be made for this. On the other hand, when



THE HOSPITAL CAR ALWAYS IN READINESS FOR FIRST AID-TO-THE-INJURED WORK

he is breathing too fast, he must sit down and rest until his breathing becomes normal.

There is one more accessory, the most dramatic of all. This is the pressure-gage carried in a pocket on the left shoulder which tells the helmet man exactly how many minutes he has to live if he does not make good his retreat.



COL. S. F CODY THE AMERICAN AERONAUT, AND THE PROPELLER OF HIS NEW BIPLANE, "CATHEDRAL," WHICH HE IS BUILDING FOR THE BRITISH GOVERNMENT

Photograph by Paul Thompson New York

In parallel curves, past which a dial hand slowly progresses, divisions are ruled showing the number of atmospheres of pressure which remain in the oxygen tank and the number of minutes of life to which they correspond. The original pressure of 150 atmospheres is equal to two hours, or 120 minutes, of life. No man is allowed to work in one of these helmets for over an hour and a half

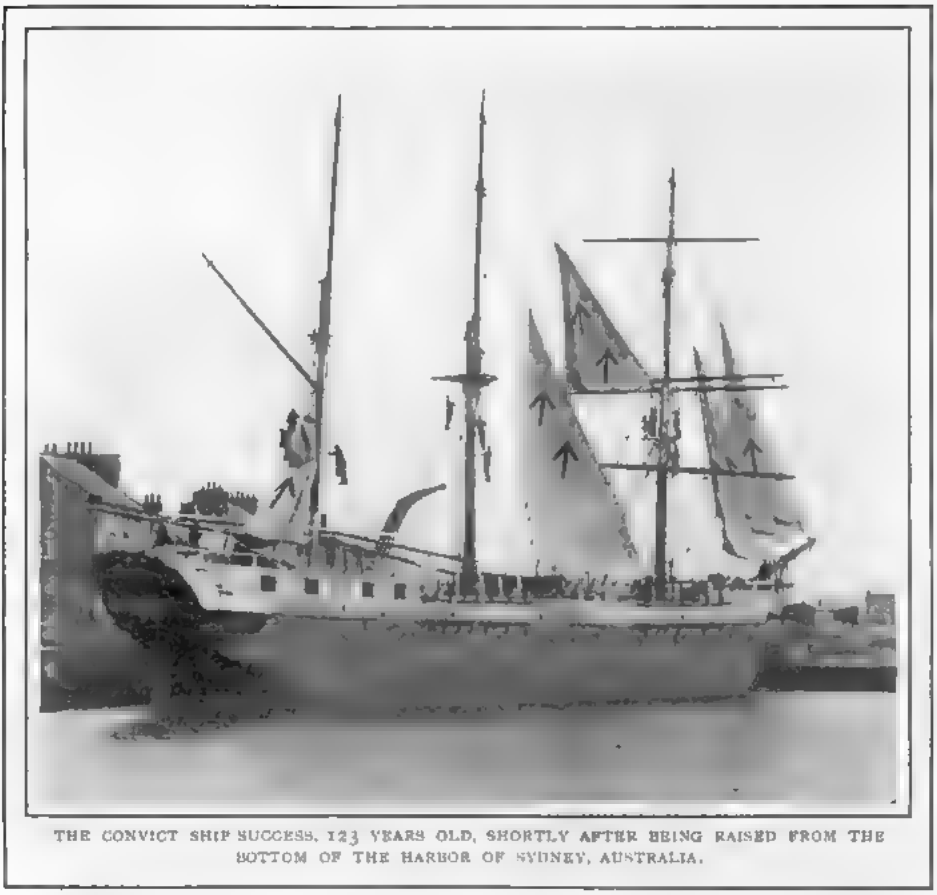
The last thirty minutes are indicated on the dial in red. After the hand reaches this danger signal he must retreat.

A trained helmet man can put on the apparatus in ten seconds, with every buckle in place and ready to turn on the oxygen. The oxygen tank and cartridge are also used with a mouth breathing apparatus which leaves the head and face exposed. Two clips on this apparatus close the nostrils, and a rubber section, with a small cylinder in front, fills the mouth and cuts off the outside air from that.

The check-valves on either end of the cylinder are attached to the breathing-bag and operate in the same way as the check-valves in the helmet. With this mouth-breathing device a pair of goggles somewhat similar to automobile goggles must be worn to protect the eyes.

CODY'S AEROPLANE HOOK.

COL. S. F. CODY, the American aeronaut, believes that he has a new plan for battling with the enemy when war in the sky becomes a fact He calls his plan "fishing for the enemy," and hopes to give it a "try-out" with his new biplane, Cathedral The plan is this: The Cathedral is sent up to a height of a thousand feet above the enemy's air-ship. The aeronaut drops a grappling-hook attached to a piano-wire. With this he rips the envelope of the enemy and sets off an explosive bomb that ignites the escaping gas. The hostile monster crumples up, blazing, and falls harmless, its crew being dashed to death. Having hooked the hostile air-ship with the grapnel, this and its bomb are released by the pull of the aeroplane. The bomb explodes, shooting flames in six directions, each to a distance of about eight feet, and scattering blazing tow. The cable is five thousand feet in length, wound on a drum geared to the motor by a friction-clutch and manipulated by a foot lever.



THE CONVICT SHIP SUCCESS, 123 YEARS OLD, SHORTLY AFTER BEING RAISED FROM THE BOTTOM OF THE HARBOR OF SYDNEY, AUSTRALIA.

RELICS OF THE MECHANICS OF TORTURE.

AFTER an existence stretching over one hundred and twenty-three years, during which she left her record in history as the most outrageous embodiment of the mechanics of torture, the prison-ship Success, a notorious English vessel, is now being taken to various ports in the United States where all her devilish devices for the practise of inhuman cruelty may be seen and impressively understood by the people of this day. Adorned in the arrow-marked livery of British degradation, she recently sailed into New York Harbor, where she has been visited by thousands.

The Success was built in 1790 at Moulmain, British India. She is, today, the oldest boat afloat, and the only remaining example of the prison ships that were so commonly known as "ocean hells" only as far back as 1868.

She is massively built of teak, and was originally intended as an armed East India merchantman. Her tonnage is 589, and she is 135 feet long with a beam of 29 feet. Her sides are 2 feet 6 inches thick.

Broken only by an occasional conflict with a pirate craft, the Success was considered a worthy vessel until 1802, when she was chartered by the British government to transport the overflow of English jails to Australia. These convicts were taken to New South Wales, Australia, then known as a penal settlement, and were often sentenced to a term of seven years or even life imprisonment for offenses that now are considered petty and are punished no more severely than by a fine.

At the period there were 145 offenses for which the penalty was *death!* The laws of England, at that time, respecting crime were disgracefully cruel.

The human cargoes of the Success died like animals. On her maiden trip she carried 939 prisoners, 251 of whom died disgusting deaths induced by inhuman treatment and diseases resulting from filth and neglect.

METHOD OF FLOGGING DISOBEDIENT PRISONERS ABOARD THE SUCCESS.

Many of the men were so shackled that it was impossible for them to lie down in their narrow, dark cells, the only means of ventilating which were small openings between the iron bars over the heavy wooden doors.

Cells were constructed on the middle and lower decks. The lower cells were occupied by men who were considered, at the instance of the warders, to be especially dangerous. Men classed as the least undesirable were confined to the upper cells.

Convicts adjudged "refractory" were thrown into the black holes. There are two of these at the stern of the lower deck. They are scarcely more than a foot wide, and the occupants were chained to the wall in such a manner that they could move only with difficulty, and could not lie down. The terms spent in these dungeons varied from three to twenty-one days, during which the only food was bread and water.

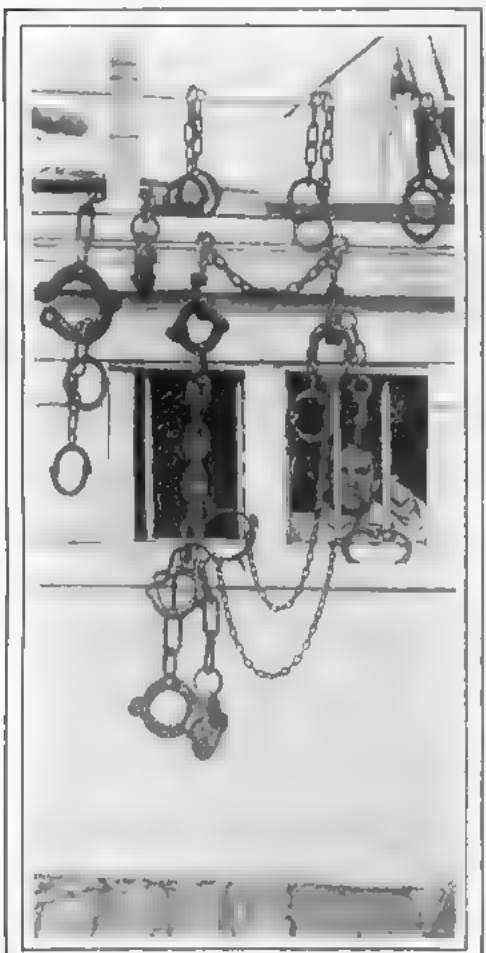
Of the men confined to the black holes, at least ninety-five per cent went crazy or died of neglect. Men who attempted to look over the tops of their cells or speak to convicts on the opposite row were taken to the lower deck and placed in the "necklers."

These were heavy iron rings that fitted about their heads like yokes. Their feet were clamped in similar but smaller rings. After a few hours in the necklers the men were sometimes flogged

For flogging the men, one of the prisoners received sixpence a day. The punishment was very severe and usually lasted until the backs of the men were cut and bleeding. To make the agony more acute, the men were frequently taken to the deck and immersed in the "pickler"—a large tank filled with brine.

Every prisoner sent aboard the Success was branded with the triangle that stamped him as a convict. Any resistance was immediately defeated by chaining him heavily and forcing him to undergo the ordeal.

In the cells as they exist to-day the floors are worn into hollows and grooves where the leg-chain of the men clanked endlessly against the planking. In 1857,



ARM AND LEG CHAINS BY WHICH PRISONERS WERE HELD FOR PUNISHMENT

THE DECK OF THE OLD SHIP BEARS MANY GROOVES MADE BY THE MEN WHO DRAGGED A BALL AND CHAIN

the disclosures that had been made public regarding the brutal treatment of prisoners created a fierce outcry demanding reform.

Captain Price, commander of the vessel, and the incarnation of fiendish brutality, attempted to stay the tide of indignation, but without avail. His own record as revealed by an official investigation was the best proof of the justice of the clamor

As a result, the Success was abandoned as a convict ship. All craft of her sort were ordered destroyed, in 1868, but, through a documentary error, the Success was not included. She was preserved and remains as the only ship of her kind in the world

In 1890 she was placed on public ex-

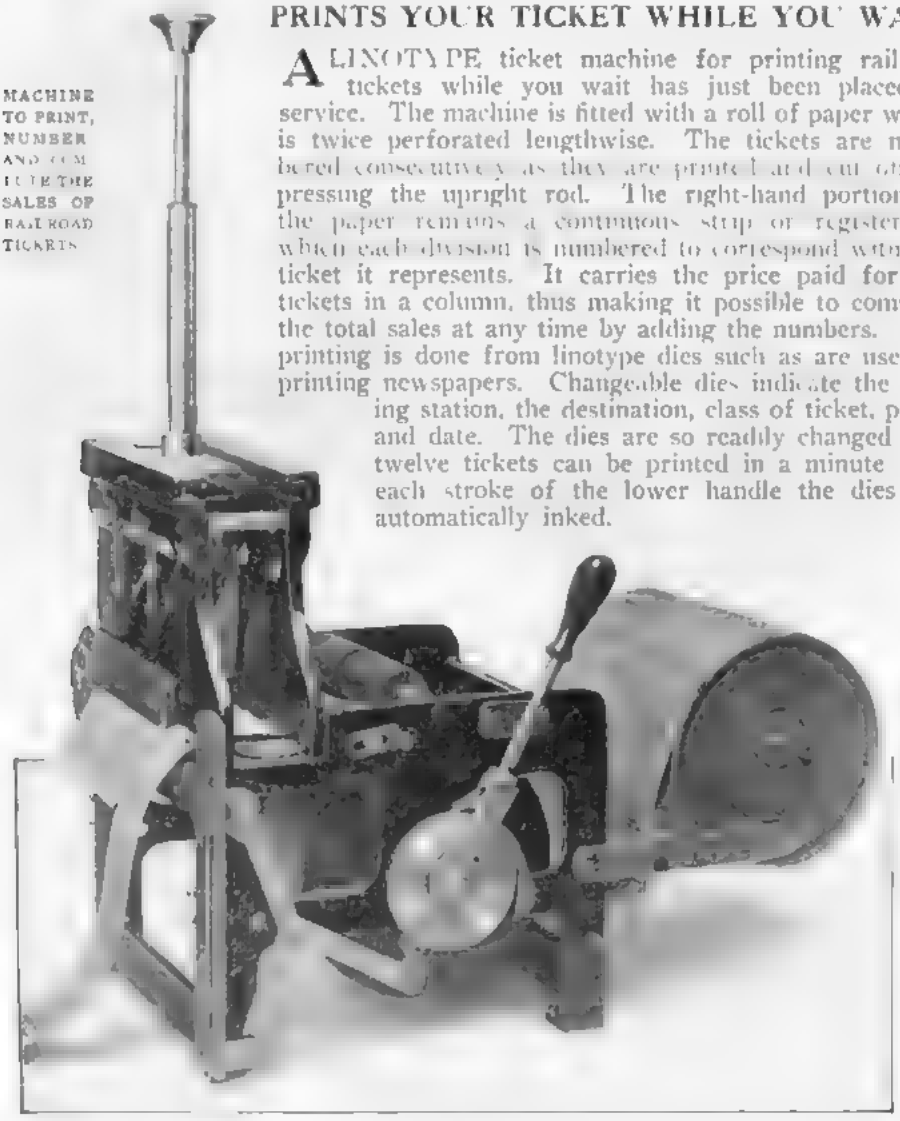
hibition. In the cells are wax dummies of the men who occupied them before she was abandoned. The figures have been reproduced with lifelike resemblance, and the bodies and faces of the men tell mute stories of the tortures they were compelled to endure.

In 1892 she was boarded in Sydney harbor by revengeful residents and sunk. She was brought to the surface, however, by English authorities and placed on exhibition.

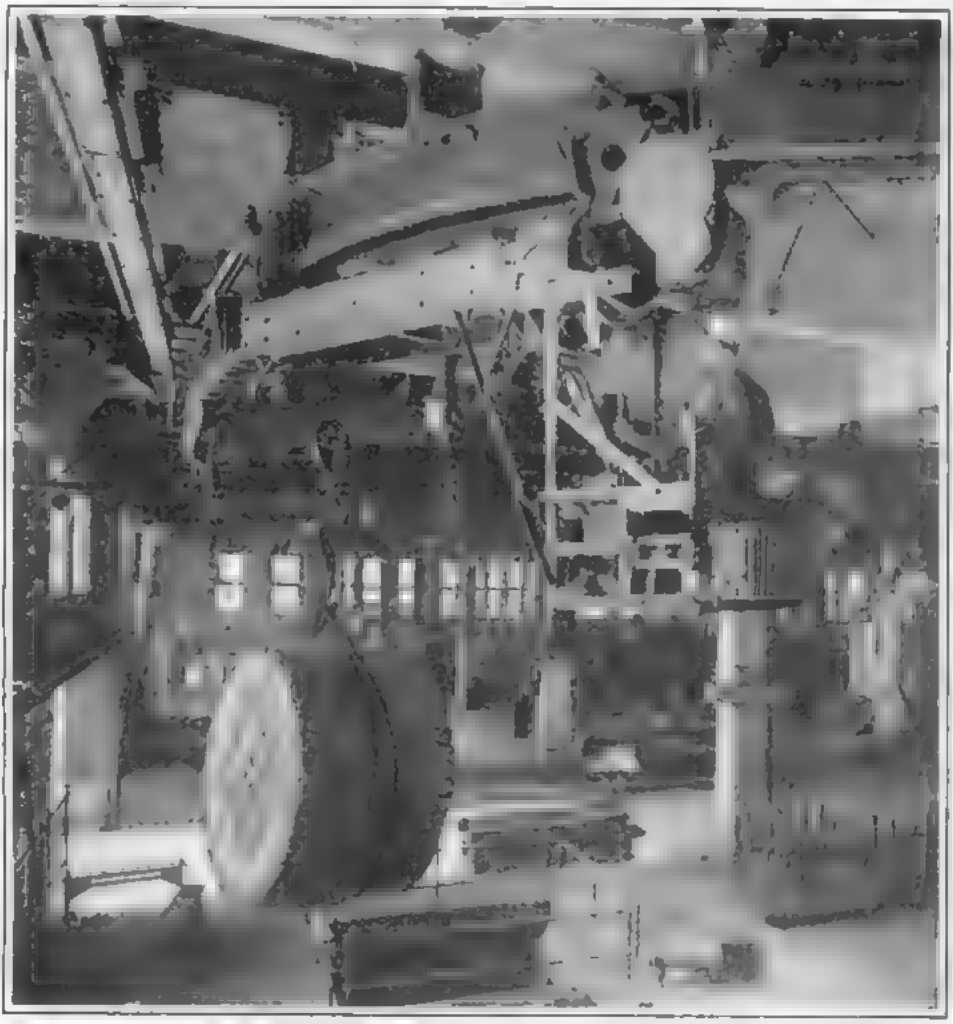
Last year she attempted what was probably the greatest feat in all her remarkable career—a passage across the Atlantic under her own sail. Lloyd's refused to insure her, but the voyage was begun. She left England on the same day as the unfortunate Titanic, and for ninety-six days she breasted the Atlantic. Several times she was in grave danger, but finally reached Boston harbor safely. On short trips along the Atlantic coast she travels under her own canvas, but on longer journeys she is towed by a tug or accompanied by a small steamship. She still carries a full crew of British sailors.

PRINTS YOUR TICKET WHILE YOU WAIT.

A LINOTYPE ticket machine for printing railroad tickets while you wait has just been placed in service. The machine is fitted with a roll of paper which is twice perforated lengthwise. The tickets are numbered consecutively as they are printed and cut off by pressing the upright rod. The right-hand portion of the paper remains a continuous strip or register on which each division is numbered to correspond with the ticket it represents. It carries the price paid for the tickets in a column, thus making it possible to compute the total sales at any time by adding the numbers. The printing is done from linotype dies such as are used in printing newspapers. Changeable dies indicate the selling station, the destination, class of ticket, price, and date. The dies are so readily changed that twelve tickets can be printed in a minute. At each stroke of the lower handle the dies are automatically inked.



MACHINE TO PRINT, NUMBER AND COMPUTE THE SALES OF RAILROAD TICKETS

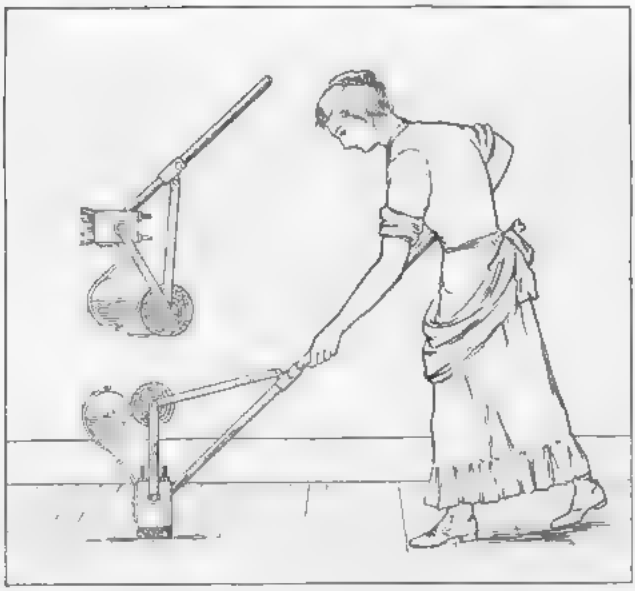


ELECTRIC OVERHEAD CRANE AND FREIGHT HOIST FOR HANDLING HEAVY FREIGHT SHIPMENTS AT RAILROAD TERMINALS

OVERHEAD ELECTRIC RAILWAY CARRIES FIVE TONS.

OVERHEAD runways are fast supplanting the old methods of handling material in freight-houses, and the accompanying illustration shows the very latest development of this method of transporting numerous kinds of goods to various points where they are loaded on cars. The runway shown in the picture is installed in the freight warehouses of the Frisco System at St Louis It is operated by electricity which it receives through the medium of the rails from which it is suspended. The movement of steel conveyor is controlled by levers very similar to those used on an automobile. The actuating motors are located almost above the driver's head, as can be seen in the picture. Five tons can be carried without slackening speed or endangering the equipment of the runway.

The coil of cable was carried to a chute, which appears directly underneath the load. This chute leads to a lower floor where the cable was loaded on a car. The huge cask was simply lowered through the chute and the task was completed in five minutes



CLEANSING FLUID, MOP, AND BRUSH COMBINED

SCRUBBING MADE EASY.

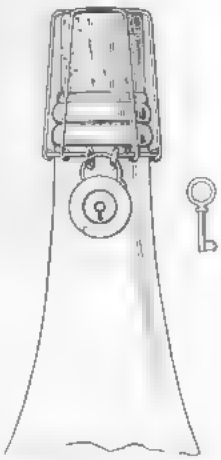
A LABOR-SAVING mop and scrubbing brush has been invented by Edward W. Barnwell, Lake Park, Georgia. A small tank fitted with a screw spout through which the tank is filled carries two pipes, one of which extends to the brush and the other to a mop of a circular type. These pipes are attached to fluid drums. The mop revolves on a rod attached to a bar which is part of the main frame.

When the scrubbing end is placed on the floor, as is shown in the drawing, the water immediately flows into the brush, and the scrubbing can be done without laboriously bending one's back. On the other hand, if the position of the implement be reversed, the mop receives the flow.

The fluid drum which feeds the mop is so arranged that by pushing the mop backward and forward and bearing heavily on it, the water which it has absorbed is forced back into the drum and back into the tank. To further eliminate the drudgery of such work, the water may be mixed with soap or cleansing powder. The washing of the floors can be finished and wiped clean and dry with the mop

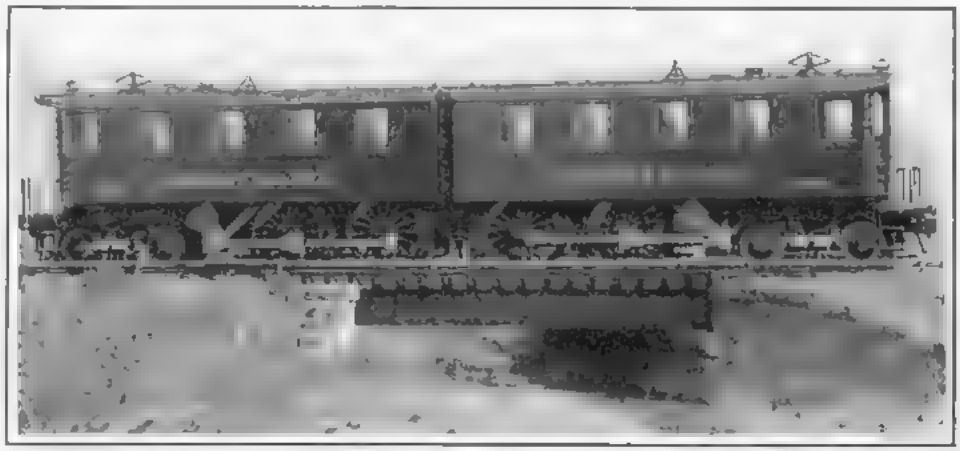
A SAFETY CORK.

AN ingenious device has been recorded in France by a man a member of whose family made the deadly mistake of drinking poison from a bottle which was supposed to contain cough medicine. In order that it may be prevented, the French inventor has devised a wire hood which can be slipped easily over the cork and upper part of a bottle's neck. The hood is held in position by a little padlock which slips through eyelets. The bottle cannot be opened by any one save the person who keeps the key. This should prove useful to those who wish to keep a tab on their liquors.



CURIOSITIES CAUGHT BY THE CAMERA

IF you are a camera fiend here is a chance for you to sell your photographs and make your camera a paying investment. We want odd, unusual, and curious photographs of all sorts; photographs that are interesting because they are out of the ordinary. Submit whatever pictures of this description you take anywhere. Unless accompanied by stamps, photographs will not be returned. Address, Current Mechanics Department, The Frank A. Munsey Company, 175 Fifth Avenue, New York.



ONE OF THE ELECTRIC ENGINES USED TO HAUL PASSENGER-TRAINS FROM MANHATTAN JUNCTION NEW JERSEY UNDER THE HUDSON RIVER TO THE PENNSYLVANIA DEPOT IN NEW YORK CITY, A DISTANCE OF ABOUT SEVEN MILES. THESE ENGINES, WHICH ARE REALLY TWO ENGINES COUPLED TOGETHER—HAVE TWO MOTORS EACH OF 2,000 HORSE-POWER AND ARE CAPABLE OF A DRAW-BAR PULL OF OVER 70,000 POUNDS. THEY WEIGH 157 TONS

RAILROADING UNDER A RIVER.

Why the Pennsylvania Railroad Tubes Under the Hudson River Do Not Rest on Solid Bottom But Rise and Fall with the Tides.

BY ARTHUR J. MANSON.

HAULING trains under the Hudson and East Rivers, New York City, is one of the most noteworthy undertakings of recent times. It required the combined efforts of master minds in all fields of engineering, civil, mechanical, and electrical. What makes this project so conspicuous is that without electricity it would be impossible.

The grades in the tunnels are severe. Eliminating the smoke and gases which must necessarily follow with the use of the steam engine, the severe requirements—handling heavy all-steel passenger-trains at high speeds up the heavy grades in the tunnels, could not be met with the steam locomotive.

Electricity first got its real start for general use in the development of the dynamo. The second great impetus was the development and the perfection of the alternating current system of generation and distribution by George Westinghouse, the inventor of the air-brake. This system is used the world over.

Alternating currents at pressures as high as 110,000 volts are transmitted for distances exceeding two hundred miles. It is due to the perfection of this alternating current distribution that the handling of heavy trains by electricity is possible. Without this system it would be impracticable to operate the service through the river tunnels that connect New York City with New Jersey and Long Island.

These heavy all-steel trains of twelve and, frequently, fourteen cars, weighing as much as one thousand tons, are hauled by powerful electric locomotives equal in capacity to more than a hundred trolley cars. These locomotives can make seventy miles an hour and, as they have the power to pull such heavy loads, they can practically be called freight locomotives capable of running at express speeds.

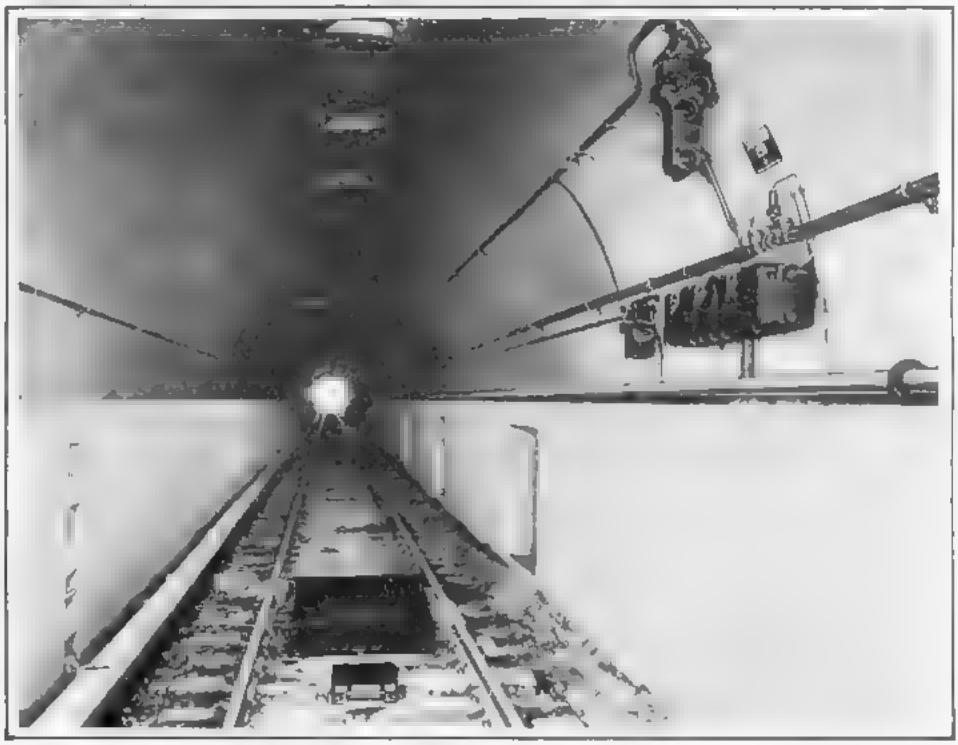
It is these two characteristics embodied in one locomotive which makes possible the severe service through these tunnels and eliminates the steam locomotive.- Electric locomotives of large capacity were first used in the Baltimore and Ohio Railroad tunnels at Baltimore, in 1895. Shortly after electric locomotives were used in one of the railroad terminals in Paris, France.

It was the success of these two electrifications which settled in the minds of the Pennsylvania Railroad officials that the better way to enter New York City would be through tubes under the rivers than by bridges.

The construction of tunnels of such proportions that the largest passenger or Pullman could pass through was an extremely hazardous undertaking. It was also without precedent.

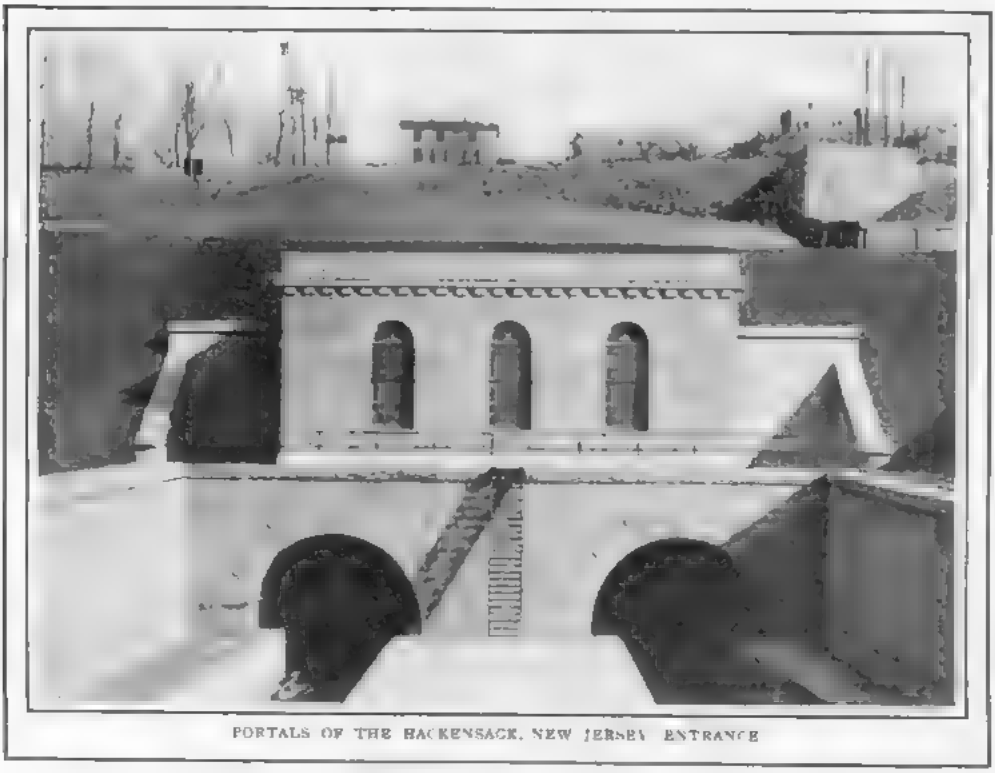
It was necessary to have the tunnels located below the United States government dredging line of forty feet below mean low water, and at places the tunnels are ninety feet below. Borings taken across the river directly over the center line of the tunnels indicated that the tunnels would have to pass through a soft river bottom, or silt, and that the solid ground or rock would be many feet below. The silt on analysis was found to contain about thirty-eight per cent of water.

Every precaution was taken to protect the lives of the hundreds of men who worked night and day under many fathoms of rock, gravel, and mud in an air-pressure several times normal



VIEW OF ONE SIDE OF THE PENNSYLVANIA TUNNEL LOOKING TOWARD THE ENTRANCE NEAR HACKENSACK, NEW JERSEY. THE POCKETS SHOWN AT THE SIDE ARE FOR THE TRACKMEN TO ENTER WHEN A TRAIN PASSES

Men were secured who had been engaged in this kind of work for years. Many of them were foreigners who had dug tunnels in foreign lands It was the policy of the railroad that the tunnels should be the best and safest that could



PORTALS OF THE HACKENSACK, NEW JERSEY ENTRANCE

be built. Every improvement known to man was employed. It has been truly said that no project was ever carried out where emphasis was placed entirely upon the results—strength, safety, permanency — rather than upon the money it cost to attain them.

The Pennsylvania tunnels consist of a series of iron rings. The installation of every ring meant an advance of two and a half feet. Eleven segments and a keypiece at the top complete an entire ring weighing about fifteen tons.

The cast-iron plates, or sections, of the rings have flanges at right angles to the surface, and bolts through these flanges hold the successive rings together

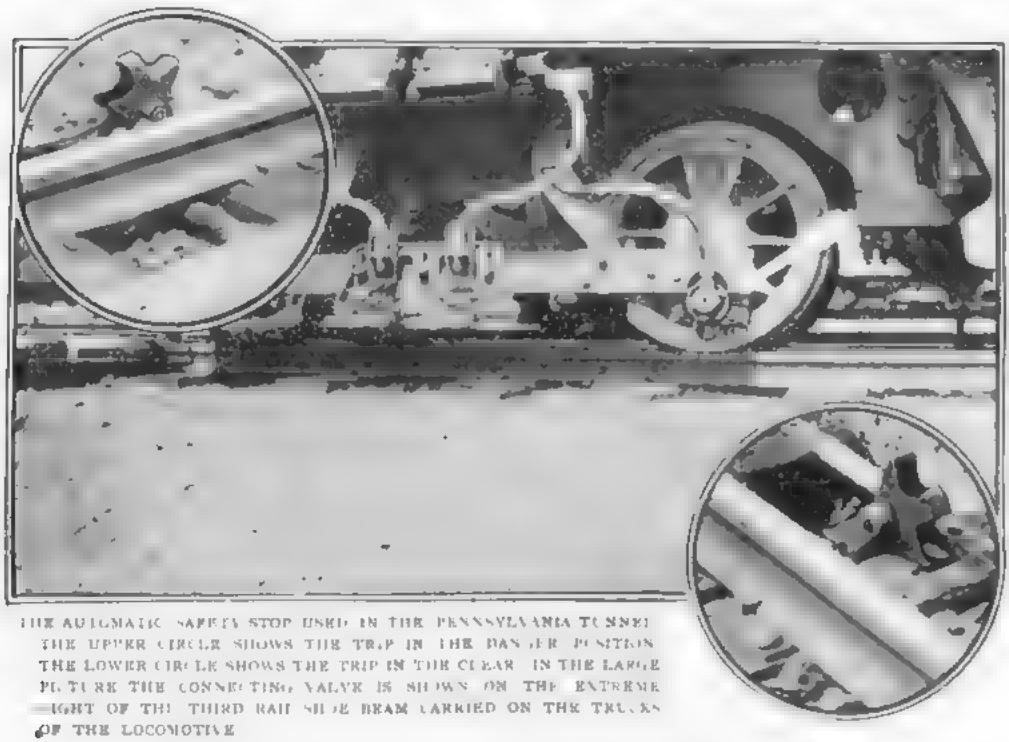
The shield method was used in digging. A huge shield weighing nearly two hundreds tons and containing nine doors, through which came the sand and silt, was pushed forward by hydraulic rams. The progress of this shield was followed up by the tunnel rings.

An idea as to the rapidity with which the tunnel progressed, foot by foot, can be formed when it is known that in one day of eight hours five rings were put in place — a total distance of twelve and one-half feet.

As tunnels and tubes pass through silt, it was at first decided to anchor them by means of steel screw-piles. Every few yards steel screws about four feet in diameter were to be screwed through the silt to solid ground and fastened to the bottom of the iron sections of the tunnels. At first this was thought necessary, but further figuring proved that the piles were not required

So a great tunnel is resting in soft silt and is only fastened at either end where the tubes pass through the solid rock. It is like a big cable stretched between the two banks of the river.

As an additional factor of safety steel sections, instead of cast iron, were used



THE AUTOMATIC SAFETY STOP USED IN THE PENNSYLVANIA TUNNEL THE UPPER CIRCLE SHOWS THE TRIP IN THE DANGER POSITION THE LOWER CIRCLE SHOWS THE TRIP IN THE CLEAR IN THE LARGE PICTURE THE CONNECTING VALVE IS SHOWN ON THE EXTREME RIGHT OF THE THIRD RAIL SHOE BEAM CARRIED ON THE TRUCKS OF THE LOCOMOTIVE

at either end where the tubes leave the solid ground and enter the silt

One of the most interesting and astonishing facts regarding these tunnels is their rise and fall with the tides

The average rise of the tide in the Hudson River is something like 4.4 feet and the tunnels rise and fall a distance of something like one-eighth of an inch They are lowest at high tide.

A false impression must not be given that the entire weight of these tubes of steel and iron, lined with a heavy thickness of concrete, is supported at either end at solid ground. It must be remembered that these tunnels are hollow and that they have replaced a certain amount of silt

What is the pull at the ends? Is each tunnel trying to sink or trying to rise to the surface? Let us see.

One foot of the tunnel, before being lined with concrete, would weigh, approximately, 12,000 pounds. When finished, with ballast and track, it would weigh, approximately, 31,500 pounds When loaded by a train of maximum weight it would weigh, approximately, 43,000 pounds.

The silt in the bottom of the Hudson River weighs an average of 100 pounds per cubic feet, and the weight of silt displaced by the tunnel for a distance of one foot in length is approximately 41,500 pounds

This figure is midway between the final weights given above; so at times these tubes are being held down and prevented from working up through the silt, while at other times they are held from sinking

The tendency in either direction is small, and they can be considered as almost *floating* in the mud and silt

It is almost impossible to conceive this situation, but such is the case. The Pennsylvania tunnel is a credit to every man who took the smallest part in its construction

In the layout of the tracks and signals in the tunnels and yard the safety of the traveling public was the chief concern The service calls for heavy trains over heavy grades at high speed. A reliable and thorough signal system was necessary

To eliminate any personal error of the engineers operating the electric locomo-

tives, automatic track stops are installed at regular intervals.

Should a train run by a danger signal the air brakes are applied to the entire train, bringing it to an immediate stop.

As an additional safety, a "dead man's" attachment is applied to the throttle. It is known as the master controller of the electric locomotive. If an engineer should become incapacitated suddenly the train would be brought to a stop by the air-brake being applied automatically when the engineer's grip on the handle relaxes.

It is true that these safety devices are not entirely new, that they have been used successfully in the New York subway, but the conditions encountered on the railroad are far different. However, the same appliance can be applied as easily to a steam locomotive as to an electric locomotive

The type of "trip" on the trucks of the cars in the subway—a handle, like a cut-out cock is not permissible where trains run in the open. It was found almost impossible to design a trip that would stand the hard blows of heavy electric trains running over sixty miles an hour.

The projecting handle could be hit easily by flying ballast or any obstructions along the track, causing an unnecessary delay to the train.

Many schemes were tried out before the present arrangement was reached.

The existing trip is absolutely positive. The parts are light, eliminating the sluggish action that would result if heavy parts were used.

The trip is mounted on either side of the track on a square shaft. This shaft is turned through an angle of about thirty degrees by an air-piston located between the rails and protected by an iron cover.

The air is admitted to and released from this piston by the position of the signal. When at danger, the trips are in the "up" position, ready to engage with the tripping mechanism on the locomotive. When signal is clear, these trips are "down," so that a locomotive may pass clear.

The peculiar shape of these trips—like three teeth—is for the successful operation of the valves on the locomotive. The valves are located on an extension of the third rail shoe beams.

There are two V-shaped castings, known as "plows," with a plunger between them. The plunger is very light, and when pushed upward a certain distance, air is exhausted from the train-line and is led to this valve through a rubber hose attachment

When the trip is at danger the leading plow hits the middle tooth and rotates the trip. The outside tooth then passes between the two plows, pushing up the plunger and setting the brakes to emergency.

Springs are placed on either side of the trip, so that it is simply pressed down, without damage, after the valve has opened as the locomotive passes by.

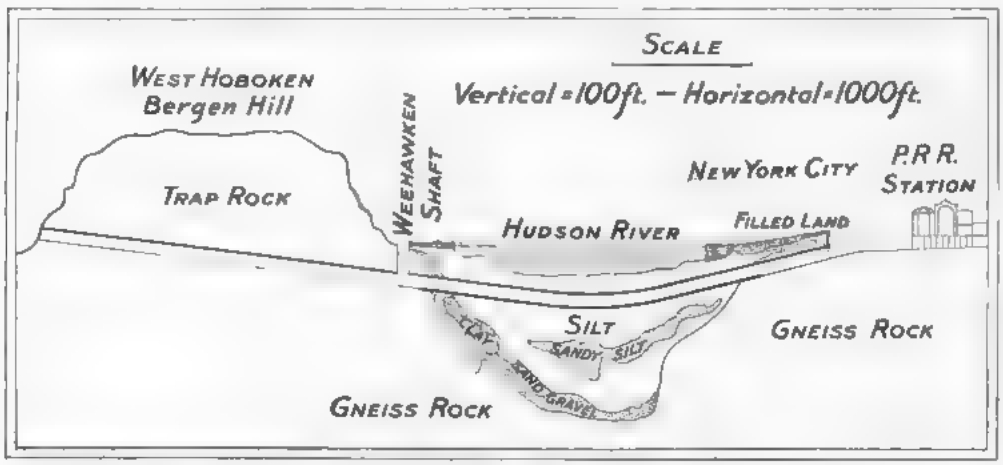


DIAGRAM OF THE PENNSYLVANIA TUNNEL AND BED OF THE HUDSON RIVER

SNARING THE BOHUNK.

How the Man-Catchers of the Northwest Lure the Helpless Laborer to Intolerable Conditions in the End-of-Steel Villages and Drive Men to Desertion and Death.

BY W. LACEY AMY

(Author of "Finding a Railroad Route O'er the Northern Rockies").

DOGGEDLY, dully, despondently, a line of weary men winds eastward along the rugged tote road that clings to the mountainside a thousand feet above the tumbling Frazer River.

In the tar-papered, canvas-roofed hospital at Fitzhugh the helpless doctors watch the cold hand of pneumonia grip the unresisting foreigner whose dying wish they cannot interpret.

Beside the railway grade a cross of rough boards at the head of a rudely fenced mound bears only the name, "Robert Mathers, U. S. A."

Beneath the terrible whirlpools and rapids of the Frazer Cañon scores of men sleep forgotten and unnamed.

When the order goes out for the laying of steel it is not the cost in men that is reckoned. When a railway cuts and blasts and digs its relentless way through a mountain pass like the Yellowhead of the Northern Canadian Rockies the payment in human lives is the chapter of construction that is never unfolded.

Wandering Americans, derelict Englishmen, Poles, Swedes, Italians, Hungarians, Bulgarians, and Russians who have yielded to the temptation of foreign gold, drop from the lists of the living unnoticed and unmourned.

These are the penalties of construction; the uncounted cost to humanity of the demands of commerce; the payment in blood for the gain in gold.

That long chapter of the pitilessness of progress in the history of the construction of the Grand Trunk Pacific through the Yellowhead Pass is not the less interesting because it is unwritten. Danger to human life makes absorbing reading; but the contractor cannot be expected to recognize the whims of the public.

That wonderful "system," the most complete in modern life, that entices the bohunk—as the laborer is called into the mountains and keeps him there under the untrammeled control of his taskmasters, is at its highest point of development in the chloroforming of the public.

Its anxiety for privacy is not necessarily an acknowledgment of fault—the contractor has too lofty an idea of his share in the advance of civilization for that—but an appreciation of the suffering bohunk, ignorant, unsophisticated, unversed in the ways of the new country, stolid and uncomplaining, as the ideal object for hysterical sympathy.

The hands of the contractors are too busy with the vagaries of such a man to allow him the added weight of popular sentiment.

Besides, there is that which the contractor dare not publish. Even the callous would cry out at the revelation. Truly, the greatness of the system is in its own concealment.

Between the contractor and the bohunk is a constant struggle of wits. The first has all the advantage of brains, experience, dollars, and the remoteness of

the law; but the second stands almost on a level through his disregard for all restraint save the human fist.

At the first stage of negotiations the bohunk is at a disadvantage. The employment agent is willing to promise anything. Agents in the eastern provinces and in the United States, who know nothing of conditions, and care less, pocket their commissions and leave the contractor to settle with a disgusted workman

At Mile 53, B. C., a lump of a youth wandering hungrily around the cook-house caught my attention. The day before I had noticed his big shock of fair hair and his face unaccustomed to the razor. This day, as I came from a hearty dinner, his hollow eyes and ravenous face spoke plainly of starvation. I spoke to him, and, after he had eaten with the avidity of long hunger, controlled only by the embarrassment of novelty, he told me his story—one of a score I heard.

Boy Helpless in Wilderness.

A week before, full of the idea of getting into an engineers' camp on construction as a start to an engineer's career, he had approached an employment agent in Edmonton.

Of course the agent had just what the boy wanted, and, after the commission had been paid, the boy was shipped into the mountains.

Only as far as Fitzhugh could the young fellow buy his way, and the next seventy miles he covered on foot or bumpers.

When he arrived there was no position for him; the contractors have nothing to do with the engineers' camps The only thing open to him was work on the grade with the foreigners a hundred miles further on in the wilderness, and this he would not accept

For a day he had wearily watched us coming satisfied from the cook-house, but there was no way to slip in unnoticed where a man stood at the door and collected tickets.

I bought him several meals, and one early morning, just before the uncertain train left for Fitzhugh, he came to my tent and bade me a shaky farewell. He was going to try to steal a ride out.

He would accept no money. He was in a humor that would make him shoot the man who opposed him. I never saw him again. Perhaps the train-agent had pity on him.

The agent in the employment office at Edmonton, Alberta, is the last public step of the system. The door closes on the bohunk as soon as he leaves the front and, with the shutting off of the outside glare, he passes immediately into the clutch of the man-catcher, a trusted employee who is a vital part of the struggle to keep the grade manned.

How Man-Catchers Work.

The man-catcher is a big personality, strong in mind and muscle, a man whose pay-check calls for diplomacy, daring, bluff, and heavy fists.

At the door of the employment office his hand closes on the bohunk and grips until the end of steel is reached. Alone he must handle thousands of lawless, reckless foreigners. Alone he must watch their every mood, anticipate every moment of repentance, rush them along to the tune of his own wishes, and finally deliver them to the camps far in the mountains.

Back and forth between the work and civilization he flits, bringing in a half-hundred men to-day, turning back a half dozen deserters to-morrow, and rushing out to the front for another gang before the last has made up its slow mind.

Promising, threatening, wheedling, even fighting viciously, he spends every waking hour in the effort to convince the "hunk" that the work of construction is best for his pocket—or his skin. The man-catcher is a strategist first, but always a slugger and bully.

At Mile 28, B. C., the end of steel at that time, a man-catcher unloaded a crowd of foreigners for the grade many miles beyond. Weighted down with the variety of impedimenta affected by the bohunk, they staggered along the rough grade to Mile 44.

Then, tired and disgusted, they determined to turn back. The arguments and petitions of the man-catcher had no effect. Thereupon he promptly backed against a rock, drew a revolver, and fired straight into the crowd.

One man took the bullet in his hip—and the rest trudged terrified on to the end of grade.

Sneered at New Victims.

Later an itinerant constable heard of the affair and arrested the man-catcher. He was fined one hundred dollars. It was a cheap gang at that. Only one man-catcher has been fined for carrying a revolver just one—and his estate would draw the first week's wages of a man-catcher without a revolver.

Arrived a couple of miles from the end of steel and the main construction-camp, where the train dumps its living load, the bohunk is like a stranger in a great city.

The man-catcher has completed his work at that point and is glad to drop the responsibility.

Two hundred foreigners stepped off the train one night there at the far edge of the Rockies. On a siding about forty box cars poured forth their clamoring occupants to meet the crowd that climbed doubtfully from the colonist coaches of the train

There was no word of greeting, no smile of welcome; only a few sneers and gibes and gapes of frank curiosity at the men who willingly undertook to sell themselves into the life they were living.

Perhaps the old hands were of a different nationality and knew not how to welcome, but it was more likely the sophomore criticizing the freshman without the restraint of civilization.

The newcomers dropped stiffly from the platforms, looking hesitatingly about at their future home, blinking feebly at the cynical workmen drawn up, hands in pockets, to laugh at them as *they* had been laughed at a month or two before.

Inside the Jaws of Death.

Some of them struck up the track for the first empty cars that offered a roof. The rest wandered into the bush beside the track leading to Sand Creek, an end-of-steel village not far away.

It was the first step in "doing as the Romans do." For the end-of-steel village is the beginning for most of them—as it is the end of many.

An end-of-steel village is a wart on the face of the earth. It is a blemish no doctor treats; it goes on fostering its own corruption until it spreads to the poor bohunk wild for excitement and relief and forgetfulness.

It settles down just three miles from the very end of steel, for the contractor maintains control of that three-mile radius and does his best to keep the men from the baneful influence

The score of log shacks that form the village extend along an indefinite street and close in on the visiting bohunk after a wink of invitation.

But inside are jaws of death. Poolrooms are the most respectable of the buildings, and the entire gamut of crime and debauchery is covered, down to the little hut whose red blind is its advertisement.

"Free Bunk House" is the sign over the door of a dirty hovel provided in the end-of-steel village by the contractors with the knowledge that the life of drink and carousal there is best met by a place close at hand wherein to sleep it off.

Perhaps the bohunk reports for work next day perhaps he doesn't. Some of them make their last report with a doped glass in their hands or a knife between their ribs.

Divekeepers Fleece the Bohunks.

In Sand Creek one night a dozen gambling hells were drawing their last cents from some bohunks blind with the glare and blare of the excitement.

A crowd surged out from one bright door. It was following a struggling, tearing pair of men—one the proprietor of the place and the other a bohunk.

"It's such drunks as you put this place on the bum!" shrieked the proprietor.

The sentiment, not the humor of it, caught the crowd and there was a cheer of applause. A group of men ran from the doors of surrounding shacks. There was a sudden furious mix-up in the mob—and the next minute they were tossing to one side the limp body of the foreign workman

There is no chance for the poor bohunk in an end-of-steel village where all the divekeepers club together for their mutual welfare

The character of the bohunk himself

is largely responsible for the dangers of construction.

There in the wilds the foreign nature of him maintains its course unimpeded. His instincts bring his own destruction, his resistance to sanitary control makes him his own victim, his carelessness adds daily to the list of dead and injured.

Civilization is too far distant to force him into conformity with its rules. The contractor has not the power, even if he possessed the wish, to incur the opposition of the foreigner to sensible conservation.

The bohunk sees no necessity, except under compulsion, of observing anything but his own untamed desires. He sickens, he dies — it is fate, just fate. He kills himself or his friend it is not his business except to revenge.

Late one night last summer the engineers at Mile 47 were awakened by agonized cries from the grade below.

Poisoned by Desperate Tramps.

Rushing down, they found a half-clad bohunk lying on the rocks, evidently in the throes of death. With great difficulty they carried him down the five-hundred-foot cliff to the barracks of the provincial police on the banks of the Fraser River.

Two hours later the man died, but he had managed to unfold a tale that was not uncommon in the Yellowhead Pass.

With two unknown companions he had been tramping out to the front. For supper that night he had been given a cake by one of his mates. Its bitter taste was remembered when a terrible pain seized him a few minutes later. When he attempted to escape along the grade to the barracks his erstwhile friends stripped him of everything but his underclothing.

The murderers were never caught Among the thousands on construction two foreigners can too easily escape detection and no questions are asked of the bohunk.

Force is the only arbiter of their quarrels. The pistol may be less bright than it was years ago and the knife better concealed, but both still flash at slight provocation

When the result is fatal none saw it happen or can speak intelligible English. Many an unmarked grave awaits the random spade of the years to come. Men with wounds of evident pistol or knife origin conceal them so long as they dare, and then receive medical attention in stolid silence.

The law cannot requite them; some day they will be well enough to hold the knife again

One Sunday morning, on the irregular train between the end-of-steel and Fitzhugh, the railway divisional point of the mountain section, a big Swede sat sullenly nursing a bandaged hand.

Driven Insane by Wound.

Suddenly he sprang into the aisle and tore up and down in a frenzy of pain that he had long been fighting. After a fierce struggle we managed to force him into the baggage-car and there unbound his swollen hand.

A long cut on the back of it, evidently the slash of a knife, had been concealed so long that the poison had driven him momentarily insane. From my medicine-case I was able to give temporary relief, but only constant bathing kept the man down during that long ten-hours' trip through the mountains to the Fitzhugh hospital over the seventy miles of unballasted railway.

The Swede stubbornly insisted that he had fallen on a piece of glass, but a friend admitted that his antagonist in the fight was in the hospital with a bullet through his chest.

When the knife cut would not heal the wounded man had first applied soap, then a piece of pork, and at length, when the poison was sealed in the wound, peroxide of hydrogen.

Perhaps he recovered. If he did there has probably been another fight since— if the bullet-hole through the chest resulted as fortunately.

Many of the maddest fights can be laid to the account of the horrible concoctions of liquor surreptitiously served in the Pass.

Bad Liquor Smuggled In.

The laws of construction forbid liquor, but that only adds to the profit of the whisky runners. Eight dollars a bottle — more than four days' earnings

after meals are paid for—is not a prohibitive price for the bohunk to pay.

At the end-of-steel villages the liquor is doped with poisons that sap fear and vitality alike.

Police and contractor combine against the whisky runner, but the cry for more is too insistent, the reward of success too great. Baggage is searched, wandering men are questioned, but the discovered liquor is only a small fraction of what reaches cache near the camps.

Lying one night on the shores of a lake beside the grade I was awakened by a sudden noise from the blackness over the water. An instant later another sound came from a different direction and close along the shore beside me.

Then a deep silence fell. It was broken quickly by the rattle and splash of furious rowing out on the lake, answered close at hand by equally energetic paddling.

For some time the course of the chase could be followed by the noise. It was evident the rowers were drawing away from the lone paddler. The pursuer stopped, a revolver shot rang out, but the rowing continued.

Next morning I learned that another load of liquor had succeeded in slipping past a dangerous point on the grade, a favorite watching place of the police, where the mountains crowd tightly down to the water's edge and passage is possible only by the narrow grade or by water.

Eat Dynamite in Bravado.

The whisky runners had taken to the water far back on the grade, and, sailing silently before the wind under cover of the darkness, had been revealed to the watching policeman only by an accidental noise.

Within the next five miles they would be forced to the shore by the rapids of the Fraser, and would creep forward to their cache through the forests of the wider valley.

Where foreigners, rocks, dynamite, axes, and cliffs mingle accidents are bound to happen; but the majority of them come from carelessness. Ignorance and familiarity are certain to pay a heavy toll to dynamite and rock slide. The worst dynamite disaster occurred in the fall of 1911, when a heedless act blew a gang of eight to the big list of fatalities.

The little shacks sunk in the sides of the mountains far from any camp reveal the care of the contractor in the storing of that which the "rock hogs" treat as lightly as a stick of candy, a simile all the more appropriate since bits of dynamite are sometimes actually eaten in bravado.

The system of construction is itself a menace to the workmen. The actual work of a mile of grade may be divided among a score of little contractors, many of whom perform their portion with the assistance of a few friends or relatives.

A couple of men will dig or blast through a score of feet only, and since their one idea is to make all the profit possible, there exist conditions that insure the minimum of safety.

Trusting to luck, they neglect precautions obviously demanded by the work to be performed. Dynamite is carelessly placed, the distance of retirement for the blast is inadequate, and no time is wasted in waiting for unfired charges.

Dirty Quarters Breed Disease.

Into a huge bank that must be removed they run a weak crib that may crumple like paper beneath the pressure of the earth. Inefficiently housed and fed, they think to profit at the cost of their bodies; and they fall victims to every disease that threatens.

Pneumonia and typhoid fever are fought single-handed by the contractors. The penalties exacted by neglect of sanitary precautions never impress themselves on the men. Inconvenience and momentary discomfort are more disagreeable to the bohunk than germs.

The dangers of typhoid are preferable to the bore of cleanliness.

The selection of a camp's location is an important care. A contractor pitches his camp on a dimpling mountain stream, but the best of conditions are negatived by the carelessness of the bohunk. He dies without self-censure, or recovers without a lesson, recklessly spreading the disease among those who realize the danger.

The stream that seemed so permanent when the camp was located may have

been but the irregular flow of mountain rains or uncertain glaciers, and the week afterward the bed may be dry.

Perhaps a mile above the first camp another contractor locates, mindful only of his own convenience. Immediately safety ceases for the camp below.

During 1912 the freedom from typhoid was unusual, but the previous two years had their moments when something like panic seized the workmen. The number of deaths among the engineers in 1910 proved what a general menace the bohunk can be.

Gang Buried in Slide

Indigenous to mountain construction are snow and rock slides that sweep away grade or tote road with little warning. Here and there a thunder of rock from the heights above tears down upon these trails of men and blots everything out before it in a smother of débris—and none can tell of the wandering bohunks who went down with the slide.

Five hundred feet below grade in the shadow of Mount Robson a huge gouge a hundred feet deep is torn in the opposite bank of the Fraser River.

A year ago a mountain lake that had nestled thousands of feet up in the mountains unknown to the engineers and contractors broke through its banks, rushed down upon the grade, swept it smooth to the last shovel, and bored its countless tons of water and rock into the valley a half-mile below.

During the rains of the early spring of 1912 a gang of foreigners was trudging in to work. They were warned by workmen they passed that the tote road was dangerous, and while still within sight, the warning was verified.

The entire gang was caught helpless in the rush of an immense snowslide. Only one was rescued alive. The rest smothered before they could be released.

It is not the dread of these dangers that drives the bohunk back through the mountains at the end of his first month's work. Men pass into the shadows of the hills hopeful for the profit of their hands, but their fickleness and instability seldom allow them to remain to the realization of their hopes.

Still hoping, still unsettled, they wander listlessly back to civilization. Ever the stream of weary workers pours out through the Pass, staggering, lifeless, sick of everything behind, the victims of their own vacillation.

Scores of Men Disappear.

Through that four hundred miles to Edmonton they fight their way or drift down to Fort George on the river currents; eating when the chance offers; trudging over tote road or grade, or hugging the bumpers—all to reach that new life ahead that is ever beckoning.

Unprepared they commence the long trek. Trusting to unsettled mountain passes they may walk for days with no more to eat than the berries beside the trail, or drop exhausted to await the mercies of the tramps who follow.

A gang of engineers in rapid travel down to Fort George came upon a lone bohunk wearily making his way out from construction. With more than three hundred miles of manless wilds before him he had but two pounds of rice in his "turkey"—no gun, no fishing tackle, nothing but a dogged blindness to the future.

Taking what the engineers offered, he sat down to lighten the load by eating to his capacity.

In the cañons and rapids of the Fraser—the Goat and Giscom Rapids, and the great cañon, that monster of relentless fury—lie the hidden remains of bohunks who have tried this seemingly easy, down-grade escape from construction.

At every log-jam are piled their crude rafts and broken scows, silent testimony of the scores who have disappeared. Any scowman, any laborer along the banks can tell of the sinking men he has helplessly watched.

The contractors have not been guiltless in this easy method of transportation. One of them sent a boat load of fifty-three through the cañon, a risk that savored so strongly of attempted manslaughter that it is hard to see the humor in the laughing description of how the Italians prayed and the Swedes cursed as the scow began to stand on end in the whirlpools that line the perilous course

Another contractor, after starting his engine, shoved it, with an Indian aboard,

into the currents above the cañon. All the Indian could do was to hang on, and only the fortunate flooding of the engine below the rapids enabled him to paddle ashore. The story is invariably ended with the laughing remark, "or the damned thing would have been going yet."

To run the scows through these river dangers the contractors keep expert rivermen and Indians, but even they sometimes fail to clear the great hole of one dangerous whirlpool or the rocks that protrude from the boiling waters.

A rude railway has been built around the cañon, and now all the supplies that admit of it are transshipped by this method. Those who realize the danger walk around the point that juts out to form the narrow gulch through which the waters rush, and from the cliffs above look down on the scowmen in their struggle for life.

One has caught in his camera the hopeless fight of four Indians, once as they entered the race of water, and next as they were disappearing to their deaths in the whirlpool; but the pictures will never be published.

The chief engineer of construction looked on as his spinning boat, in the charge of two Indians, whirled its freight of supplies into the water while the Indians hung desperately to the ropes as the boat stood on end in the whirlpool.

The treatment of the bohunk far beyond the end of steel will never be fully known. Along steel the contractor realizes the necessity of meeting the ease of desertion and the possible visits of annoying reformers with conditions that make life worth living.

But far in on grade, away beyond the reach of visitors, where the bohunk in flight from his work takes life in hand, and where detention may be practised with immunity—there it is different.

The bohunk who struggles out knows not the ropes of publicity, or imagines the life he left characteristic of the country and is silent. Or he babbles loudly, extravagantly, with the imagination of the excitable foreigner. And the public is nonplused for a moment—and then turns to the latest scandal.

Away in there life is necessarily severe. The conveniences and comforts of steel are impossible, and frequently the complaints are based on our demands from civilization.

One dollar a month is deducted from the men's wages and, on grade, most of that dollar is profit. There can be no doubt of the imperfections of the service. Suffering men are often treated with scant consideration; innumerable instances of this could be given.

In the wilds there has been found a system that is close to peonage; for the men scarcely dare resist the absolute power of the only authority present, and retreat into the wilds is seriously perilous.

But it is easy to blame too harshly. The bohunk is ignorant and careless, conveniences are impossible, the law is very far away, and the work must be performed by reluctant workmen.

The railway is blameless. The construction is solely in the hands of the contractors. In fact, the railway company is as sedulously kept in ignorance as is the public.

Blame attaches to the contractors. While not directly responsible for much that merits criticism, they have the power to stop it.

It is the dearth of men, not inherent heartlessness, that is the trouble.

Along that several thousand miles of unbroken mountain and forest six thousand men cannot perform the work of sixty thousand without some one suffering.

It is little wonder that the methods employed make theorists rave. Only the contractor knows that the strictly legal ways of civilization would provide only a big junket for the foreigner of fuse and shovel.

The government of Canada has not been blind to conditions. Commissions, secret and open, have investigated. The reports would make interesting reading. For reasons sufficient these reports have not been made public, nor will they be.

Gradually the government is being forced into a position of inspection over construction. The public of Canada and of the United States is being aroused. The consul-general of the United States at Winnipeg has made formal complaint, and further announcements are expected in the near future.

And the reckoning will be complete.

SCIENCE MADE SIMPLE.

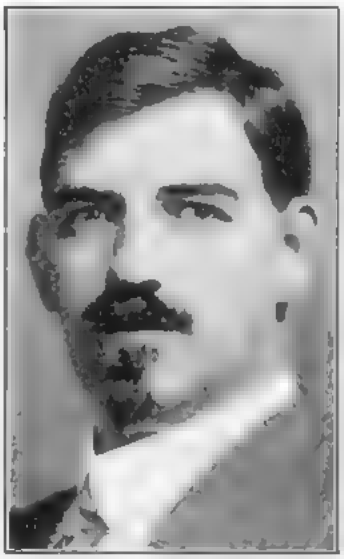
BY C. H. CLAUDY,

Author of "How Time Is Made," "How the Parts of a Locomotive Coordinate" etc., etc.

An Up-to-Date Record and a Discussion of the Latest and Most Important Events in the World of Science, Written so as to Be Easy to Understand.

HOW WIRELESS WORKS.

The Signals of Wireless Telegraphy Are Transmitted by Ether. How this Medium Transmits Them, and How They Are Detected and Understood, Is Clearly Explained in this Article.



C. H. CLAUDY

Photograph by Harris & Ewing Washington

COMMON usage corrupts the meanings of words and phrases until sight of their origin is often lost. "Wireless" means without wires. "Telegraphy," according to the derivation of the word, means "writing at a distance." So "wireless telegraphy" ought to mean "writing at a distance without wires."

Telegraphy, which was named when the electrical signals carried by a wire were transformed into records of ink on paper, long ago came to mean merely the transmission of intelligence by electricity, over wires, although it has been read by sound and not by sight for half a century. And "wireless telegraphy" has come to mean not only the transmission of intelligence over distance *without* wires, but the transmission of intelligence over distance without wires by a particular system.

Signaling by the Morse code with flags, the lantern to show "all clear" to the engineer, or the mere blowing of a whistle at a crossing, warning all to get out of the way, are truly "transmitting intelligence over distance without wires," yet they are not understood to be varieties of "wireless" telegraphy.

The term which most truly describes the wireless systems in commercial use to-day is "radiotelegraphy," and to understand what the word means and how it comes to be used is to understand the simple principles of the most wonderful and far reaching developments of communication at a distance.

Nor need the most ignorant-of-science reader think that because wireless is a scientific development, he cannot understand it. Its technical ramifications are many. They have no place on these pages. Its mathematics are profound, but so are the mathematics of sight and sound, of which every one understands something. To a certain point, the theory of wireless is simple, and within the comprehension of any one.

Before that comprehension can be had, it is necessary to arrive at an understanding of the fundamentals for the transmission of any intelligence at a distance. Whether we speak, call, signal with a whistle, wave a flag, reflect a ray of light, use a telegraph instrument, a telephone, or a wireless set, we must have three factors for our transmission.

We must have a source of energy, which starts the intelligence or message on its way, we must have some medium for carrying that energy, which by its variations of intensity conveys the intelligence; and we must have some means of recognizing the variations when they arrive at their destination, which is the means of translating the energy into terms of intelligence.

If we ring a bell once for the letter "A" and three times for the letter "S," and it is mutually agreed between us that these rings indicate these letters, you will understand the word "as" on hearing the bell ring in this way. The bell is the source of energy. The air, which transmits the vibrations of sound, is the medium which carries the energy, and the ear, which hears the sound, is the means of recognizing the energy (sound) when it gets there.

If we wave a flag once for "A" and three times for "S," the flag is the source, the light which the flag reflects to the eyes of the person to whom the message is sent is the medium, and the eyes which see are the means of recognizing the energy (light) when it arrives.

If we press an ordinary telegraph key once for "A" and three times for "S," the electric current is the source, the wire which carries the current is the medium, and the little sounder which clicks at the other end of the line is the means of recognizing the energy (electrical impulse) when it arrives.

Strange Medium of Transmission.

The medium of transmission of the wireless signal is that "ether" which science supposes to fill all space, and permeate all matter. We have never seen, tasted, smelled or otherwise recognized this ether as we see and recognize matter. Some scientists even go so far as to say it does not really exist at all; but it has been aptly said that whether this ether exists or not, everything in nature acts just as if it *did* exist, and that no other theory explains anything.

So we take it for granted that the ether does exist. A very simple experiment seems to prove that it does actually exist. If we put an electric bell into the glass receiver of an air-pump, and exhaust all the air from the bell, we can no longer hear the electric bell ring, although we can see it ringing. We have taken all the matter (air) out of the glass dome of the air-pump. There is nothing left in it but space. And yet, we *see* the bell. Light goes through the glass, strikes the bell, comes back to our eyes.

What carries the light into and out of the glass receiver?

The answer is ether, that imponderable, unknown, non-understood something which is everywhere in the universe. It transmits the sun's light and heat to us. It is supposed that gravity, the greatest force we know and the least understood, acts through it. And it is ether which transmits the wireless signals. How it transmits them, how it is made to transmit them, and how they are detected and understood, is the whole story of wireless.

Splash Stone to Send Messages.

If a stone is dropped into a still pond of water, it causes a splash. Immediately a series of small waves start from the point of the splash and radiate as from a center in ever widening circles, until they either disappear from the surface of the water, from the ultimate friction of one particle of water on another, or else, if the pond is not too large, they continue until they strike the shore.

If a heavy fog overhung the pond, so that two men on opposite sides could not see each other, one man could learn of the presence of another should one drop a stone in the water and the other observe the rocking of a chip on the water as the wavelets so caused passed beneath it.

It is conceivable that if one man had enough stones, and the other enough patience, a simple message could be sent across the pond, by dropping the stones

in the water at various intervals, according to a prearranged code. The various bobbings of the little chip which we suppose the receiving man to be watching would infallibly tell him of the droppings of the stone on the other side of the pond.

In the place of the pond, the wireless signaler has the ether which surrounds as well as permeates everything. In place of the stone, he has an electrical apparatus, which, when operated, sends forth electrical waves in the ether not unlike the waves of the pond when the stone is dropped into it. In place of the little chip which the second man watched, he who receives a wireless message has a second electrical device, which is sensitive to the peculiar electrical waves which the first electrical apparatus has sent out.

Many Different Ether Waves.

Waves in the ether are of many kinds. All forms of energy known to science by the term "radiant energy" are considered to be transmitted by wave motion in the ether. Light, radiant heat, X rays, magnetic influences, electrical disturbances, are various forms of various kinds and sizes of waves, which occur in the ether. So far as we know, they all travel at the same rate of speed through the ether, that is, at about 186,500 miles per second.

The waves differ enormously in size and in their frequency. Some are extremely small and extremely rapid the violet rays of light, for instance, have a frequency of oscillation of 760,000,000,000,000 vibrations per second seven hundred and sixty million millions—and are exceedingly minute, about 1-64,000 of an inch in length. These violet rays are the shortest and most rapidly vibrating which the human eye can recognize.

The photographic plate knows others—the "ultra violet" (so named because beyond the violet in the spectum), which are even smaller and more rapid. The longest and slowest light rays which the eye recognizes are those of red, which has a period of some 392 millions of millions per second, and are 1-33,000 of an inch long.

The wireless waves in the ether, as propagated by man-made devices, are much, much slower, running from 100,000 vibrations to a couple of millions per second. Their length is appropriately greater. Those in practical use range from three hundred feet to over six miles in length.

"Ear" Hears Electrical "Sounds."

If the string on a violin be drawn to one side, and then let go, it will oscillate, or vibrate with great rapidity, but gradually come to rest. As it vibrates, it sends forth waves of air, which, striking the sensitive receiving apparatus of our ears, we hear as sound. When it stops vibrating the waves cease and we no longer hear the sound.

The wireless signal is made in the ether on the same principle, although no movement of a physical body will set up these electrical waves. What is used is a rapidly vibrating charge of electricity. It has long been known that the discharge from a condenser is accompanied by rapid oscillations of electricity and the sending forth of electric waves, just as it has long been known that the vibration of a physical body, if rapid enough, will send forth waves of air which we call sound.

But it remained for Hertz to discover a way of making these waves continuously and of recognizing them as they came—in other words, to invent an "ear" which would "hear" the electrical waves as the human ear hears sound waves.

The wireless station, as every one knows, has always a tall mast or several towers, or some structure which rises high in air. A close examination would reveal wires passing from tower to tower. On a ship equipped with wireless, many wires are strung from mast to mast on the ship. These are known as the aerial, the antennæ or the air wire. These air wires are one surface of a condenser—the other surface is the earth.

Oscillations Detach Electrical Force.

By means of suitable electrical apparatus, this condenser is electrically charged. When it is suddenly discharged, violent electrical oscillations are set up within the condenser electricity

rushes to and fro between earth and antennæ. The oscillations are so violent, and so rapid, that waves of electrical force are detached from the antennæ and travel outward in all directions along the earth's surface.

These electrical waves (called Hertzian or Hertz waves after Professor Hertz, of the University of Bonn, whose first simple oscillator presaged the present wireless, and whose "resonator" was the first means of detecting the presence of these Hertzian waves in space) travel at the speed of light.

They radiate in space, following the curvature of the earth, gradually diminishing in intensity as they go, even as the waves in a pond caused by the dropping of a stone diminish in intensity as they travel. But because the initial "splash" has been violent, the Hertzian waves travel a long distance before they become too weak to act upon the electrical ear which is set to hear them.

This electrical ear is, of course, not an ear at all. It is a piece of apparatus called a "detector" or a "coherer" or a "resonator," according to its type. Today the resonator is relegated to the laboratory for experiment, and the coherer has been superseded by the infinitely more sensitive detector.

Sparks Produced by Coil.

If one takes a tuning fork and strikes it loudly, a second and similar tuning-fork, held within a few inches of the first, will sound. The picture glass on the wall or ornaments in a room often vibrate loudly when certain notes on a piano are struck. They are "in tune" with the vibrations which the fork or string sends out. This phenomena is called "resonance."

Hertz found that by holding near his active oscillator a circle of wire with the ends almost but not quite touching, sparks were produced between the ends of the wire he held.

He said, therefore, that his coil of wire was "in resonance" with the oscillator, and termed that coil a "resonator." This was the first "detector" of wireless waves.

But it is not sensitive enough. Even powerful Hertzian waves are not detected by it at a distance, any more than a tuning fork will respond to another tuning fork a hundred feet away. Something else had to be devised which would respond to the presence of the wireless waves even if they were faint.

This something was the "coherer." The principle of the coherer is as simple as it is wonderful. A coherer is essentially a glass tube in the ends of which are wires, between which ends is a quantity of fine metal filings. This little piece of apparatus will not transmit an electric current from an ordinary telegraph battery. The multitude of infinitesimal spaces between the thousands of metal particles offer a bar through which the feeble electrical current cannot force its way.

Hertzian Waves Reduce Resistance.

This high power of resistance to electric current, however, is enormously reduced by the presence of the Hertzian rays. In striking the mass of metal powder these electrical waves do something—no one knows just what—which permits the powdered metal to transmit electric current

So when the experimenter puts an ordinary telephone receiver in the circuit with a coherer, and a train of Hertzian rays strike the coherer, the local current is permitted to flow through the coherer and a click or buzz results in the telephone receiver.

A mere tap on the glass and the filings are "decohered" and no longer transmit the local electric current. The buzz in the telephone stops. But if another wireless wave train comes along, another buzz is heard. Let those wireless trains of waves come in a definite and understood order, the buzzing in the telephone will be heard in the same order, and the wireless transmission of intelligence has been accomplished.

The coherer, however, is now but little used in detecting the Hertzian waves in a wireless system. Far more sensitive and delicate devices, generally known as "detectors," are employed. They are of many forms, invented by many different experimenters, and are of many different principles. One of them, called a "hot wire" receiver or detector, employs in its construction the smallest wire which it is possible to make.

A small fine platinum wire is thickly coated with silver. The silver wire with the platinum "wick" is then drawn through steel dies of gradually decreasing size until the silver wire is as small as human ingenuity can make it, which is about .003 of an inch in diameter.

No Thicker Than Human Hair.

The platinum wick inside is much smaller. If the silver wire is immersed in an acid which will remove the silver, the platinum wick is bared. It has been drawn down inside the silver and prevented from breaking by its coating of silver. Platinum wire is so made of the remarkable size of 1.5 microns, or .000,06 of an inch—or, to make it still more plain, about a fortieth of the diameter of a common human hair.

If this thin wire be suitably connected in a wireless receiving station with a telephone receiver and small local current, no sound is heard in the telephone under normal conditions. But when a train of wireless waves strikes the antennæ or aerial, an oscillating current will be set up which will pass through the fine platinum wire, and in passing will heat it to a certain extent. As the resistance of the fine platinum wire to the local current *increases* with the increase in temperature, *less* current from the local battery then flows through the telephone receiver, which promptly responds with a sound.

The tiny size of the platinum wire is an essential in this kind of a receiver. The heating effect of the current is very feeble when the wireless waves come a long distance, but the mass of the fine wire is so minute, about 1-7500th of one millionth of one cubic inch, that it takes but a very feeble current to heat it, and by heating it alter the strength of the local current in the telephone headpiece.

Silent When Current Is Steady.

The electrolytic receiver also uses a similar fine wire, one end of which is touching an electrolytic solution—a weak acid or alkali. Placed in the circuit in the wireless system, a feeble current will be passed by this little device. The telephone is silent while the current is steady. Under the influence of the oscillations produced when the wireless waves strike the aerial, however, the wire and surrounding electrolytic solution are momentarily heated.

Minute bubbles of gas which have surrounded the end of the fine wire as it dips into the solution are set free, and the combined effect is to *increase* the ability of the whole to transmit the local current. The telephone instantly responds with a sound. This sound, of course, is proportionate to the strength and the duration of the wireless waves which strike the antennæ.

In even the most elementary description of the principles of wireless telegraphy, some mention must be made of the problem of selective or secret signaling. Hertzian waves are sent out in all directions and follow the curvature of the earth in widening circles. The same signals may be picked up and read by two, ten, or a hundred or more receiving stations. If two sending stations are operating at the same time, two messages will be read simultaneously by as many stations as are in "hearing" distance and confusion will result.

There are a number of ways to avoid this difficulty to a certain extent. One is the regulation of the size of the Hertzian waves sent forth. We know that the size of the air waves, and consequently the pitch of the sound, are regulated by the length of the string, as well as its tension.

Stations Equipped to "Tune In."

The shorter the string under the same tension, the higher the note, or to revert to terms common to both, the shorter and more frequent the air waves. The longer the string, the longer and slower the air waves, and the lower and deeper is the musical note.

In somewhat the same way the sending station can alter the size and frequency of the Hertzian rays. Similarly, stations are equipped so that they may "tune in" to any wave length which is being sent, making their receiving apparatus sensitive to the particular wave length which is being sent and not sensitive to any other wave length.

Thus, a ship at sea wishes to get the latest news from shore. The operator,

if he "listens" to what is going on, may hear a perfect babel of messages a dozen ships may be conversing all around him, but if the shore station alone is to be heard, the operator of this particular ship "tunes" his apparatus until almost all of the other messages are silent, and only the particular waves being sent by the shore station are received.

Of course, this does not always work out well. If the shore station is sending a 365-meter wave, and some powerful wireless apparatus on a big liner is sending a 360-meter wave, the ship "listening" will hardly be able to "tune out" the intruder. While it is theoretically possible to tune apparatus to a nicety, actual practise regards tuning to within five per cent either way as highly satisfactory. Thus, if two near-by stations are sending, one using a thousand-foot wave and the other an eleven-hundred foot wave, and a third station can tune out either one at pleasure, he considers that his apparatus is working in a very satisfactory manner.

Like Many Voices at Once.

If you have ever stood in the instrument room of a telegraph company and heard the sounders all chattering together, you must have wondered how it was possible for one man to listen to one particular sounder and distinguish what it alone was sending. To your untrained ear, the chatter of one sounder is much like the chatter of another. Yet you think nothing of talking with a friend in a crowded room, where half a hundred other people are also talking loudly.

In very much the same way the wireless operator can often read a message sent from one particular station even if several others are buzzing in his headpiece telephone. The buzzing sounds in a telephone are as distinctive when caused by the wireless waves from different stations and sent by different men, as the sounds of several telegraph sounders are different to the trained ear.

This selective auditory reading has a limit, of course, but between the power to tune in to the particular message being received and the uncanny ability to select one message from several, all being heard at once, which all experienced operators have, the transmission of wireless intelligence can go on, even with many ships or stations talking at once.

It must not be thought that because this simple explanation of the principles of wireless is compressed within the limits of a magazine story and told in non-technical language, therefore wireless is a simple subject or its apparatus elementary. The science of radiotelegraphy, to give it its right name, is highly developed, even if it is young, and its ramifications are many. A dozen or more well-recognized and sharply differentiated systems are in use, and the varieties and kinds of apparatus available are innumerable

Thirty Years Between Spark and Sound.

Between the simple oscillator of Hertz, and its tiny spark which his resonator repeated, and the crashing sound of the spark of a great trans-atlantic station, its coils, its batteries, its condensers, its aerials, its transformers, its generators, its measuring instruments, its complication and its wonder, is a gap of thirty years.

Between the wireless stations of to-day and that of to-morrow is a bigger gap. It is but ten years since Marconi demonstrated that wireless across the Atlantic was possible. The advances made in the art since that time are enormous, but the problems which remain to be solved are highly important, and experimenters are working on them all the time.

Had any one told Marconi that in less than a decade a complete wireless outfit could be loaded on a few mules and set up in the field by soldiers in less than one minute, a sixty-foot mast included, and communication opened with a station twenty-five miles away, he would probably have smiled. That we should be carrying wireless sending apparatus in aeroplanes and balloons was another dream which few had when the amazing news that man had sent his signals across the ocean without a wire was first published.

To-day the problems are being solved. To-morrow will show us how to solve

the problem of selective signaling; how to increase our radius by day to equal that of the night; how to send overland as easily as we send over sea, as well as how to regulate the legal and practical end of wireless, and avoid confusion caused by many stations talking at once.

Should you visit a great wireless station and observe its complications, the wires everywhere, the machinery, the multitudinous apparatus, you would probably require a long explanation to be perfectly clear as to which is which.

But under all complication, under all the apparatus and the highly developed technique of the art, lies the principle which Hertz discovered—that the discharge of an electric current from a condenser, made by means of an electric spark sets up peculiar oscillations, which send waves of force through the ether, and that these waves of force can be detected and transformed and made visible or audible at a distance.

We can hear the crashes of the heavy electrical discharge as the fierce hot sparks leap from terminal to terminal. We can see the aerial, shadowy in the dusk, high above the lonely station or stretching from mast to mast as the vessel tosses on those waves of water beneath. We can, if the operator permits, slip the head-piece over our ears and hear a "*buzz—buzz—buzz buzz*," and marvel when we are told, "That's Cuba, trying to pick up Norfolk."

But we cannot see the huge waves, bridging the distance from continent to continent in a fraction of a second, nor feel the tremendous speeds and power of those currents which oscillate back and forth through the sending-station apparatus in such mighty vibrations.

All we can do is wonder at the wizardry which the chained lightning works that we may talk across the world with no other connection than ether which we are not even sure exists.

HER SACRIFICE.

BY LYDIA M. DUNHAM O'NEIL.

HE toddled down to the railroad tracks,
And he toddled back again,
And told his mother, in childish words,
He had climbed on a railroad train
The engineman lifted him 'way up high -
'Way up in the cab, you know,
And showed him the bell, and made it ring
And the whistle—and made it blow
And her heart was sad, though she tried to smile,
And to share his childish joy,
For she knew she had lost her baby now —
She knew that he was a boy

His face was flushed with a glow of pride,
And proud was his boyish smile,
When he came and said he had found a place
In the railroad's rank and file
Out on the road! Where the bright rails shine
Like the point of a silver spear
Out on the road! Where the headlights gleamed,
And the whistles were sweet to hear
And her heart was sad, though she bravely smiled
As only a mother can,
For she knew she had lost her laddie now—
She knew that he was a man

Under a shroud they carried him home;
Rigid and still he lay
He spoke no word, for his lips were sealed—
Sealed till the Judgment Day
And she sadly wept as she clasped him close,
For he was her only son;
He was her all, and the joy of life
Died when his life was done
Yet, in the black sky of her boundless grief
Was a banner of pride unfurled
For she knew that she had given now
A hero to the world

The Paymasters.

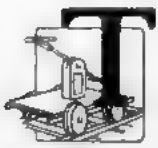
A Thrilling Novel of the Adventures of Two Men Engaged in the Building of a Brazilian Railroad.

BY H. M. LOME.

COMPLETE IN THIS ISSUE.

CHAPTER I.

Looking for the Man.



THE offices of the South American Construction Company are in one of the down-town sky-scraper buildings of New York City. Edmund J. Forbes, the manager, and his secretary, Mr. Thwaite, were seated at the big mahogany table in their private office, the furnishings of which included a huge map of South America that covered the greater portion of one of the walls, a stuffed macaw and a toucan, a bundle of spears, and a jaguar skin.

The buzzer on the table hummed softly. Mr. Thwaite put the receiver to his ear.

"A cable for you, Mr. Forbes," he said.

"Tell them to send it in," replied the manager absently. He was reading a proposition from a Para coal company that promised to save thousands of dollars a year to his own corporation.

The cable was brought and Mr. Forbes tore off the end of the envelope. An exclamation broke from his lips and a frown gathered on his forehead as he read.

"More trouble, Thwaite," he said curtly. "Listen. This is from Mannering at Jutupica. It is dated yesterday:

"Payson and guide murdered near Camp 29. Bodies found two days ago. Twenty-five thousand gold carried by Payson missing, also arms. Cable instructions."

"Bad business, sir," said the secretary.

"Bad? It's worse than bad! This is the second time in six months that our paymasters have been done to death for the sake of the money they carried. You remember poor Huxley who was found near Camp 20 with his throat cut? That was in December last, and this is July."

Thwaite nodded. "Doesn't it strike you, Mr. Forbes," he said, after a pause, "that the disappearance of the money suggests that white men are responsible for these crimes? I can't imagine what use hard cash would be to Central Brazilian savages."

The manager brought down his fist with a crash on the table.

"You're right, Thwaite—you're dead right. The idea never occurred to me before. Yet in Huxley's case there was an arrow embedded in his arm and a broken spear was found near by."

"Which might mean that they were used as a blind or that the white bandit had natives in his employ," suggested the secretary.

Mr. Forbes began to pace the floor.

"Again, I am inclined to think that you are on the right track," he said. "The initial motive in each instance was robbery. As you have suggested,

an Indian couldn't spend the money even if he laid his unwashed hands on it. White men it must be, then; but that conclusion doesn't help us any."

"Not as far as running the criminals to earth is concerned. But I venture to think that it points a way to preventing such crimes in the future."

Forbes stopped his restless walk and stared at the secretary.

"Let's have your theory, Thwaite. Upon my word, I'm only just finding out what a clever chap you are."

"Hardly that, sir. Simply a question of gluing common sense to a situation. Here are my ideas on the subject. So far, the company has appointed its paymasters from the office force, either here in New York or at Jutupica. Good, plucky fellows, undoubtedly, but mostly city men. Totally unused to taking care of themselves when in the wild.

"Now, sir, it seems to me that this is all wrong. A man needn't have a training in the office end of railroad affairs to make him a paymaster, especially when his duties call him into Brazilian jungles where he has to buck snakes, savages, and scoundrels of the kind that are responsible for Payson's death.

"What you want is a man who can do the work and yet take care of himself—a man who knows the muzzle of a rifle from the butt, who can grub, sleep, and live in the open just as comfortably as he can in a Broadway hotel. If he is a fighter, so much the better. Such a man ought to be a match for jungle bandits of any color."

Mr. Forbes walked the length of the office floor twice before he said anything in reply.

"You've hit it plumb center, Thwaite." He had halted abruptly and faced the secretary. "This ought to have been done before. It was the duty of Mannering, who is on the spot, to recommend this plan of yours. Where shall we find the man?"

"I don't think there will be any difficulty about that, Mr. Forbes. Out of the hundreds of applications for employment that reach us, surely there must be one or more that will fill the bill."

"How long before you can find a man? This is a rush matter, you know."

"I can make a recommendation immediately, I think," replied the secretary, as he rose and opened a drawer in the correspondence cabinet. "Of course, I know nothing about this person except what he tells me in his letters; this is confirmed by the individuals that he has given for reference, including Walter Osborn of the field force at Jutupica.

"But I like the tone of his correspondence. Something about it impressed me. I looked him up and filed him for future reference. Here it is. This is my condensation of his case:

> "Harry Deering, thirty. Born in Texas. Educated in the public schools and university of that State. Father, owner of the Double S Ranch, of Reeves County, Texas. Has traveled in Mexico, Panama, and Colombia. Now assisting his father on ranch. Athletic, used to roughing it, good horseman, and has furnished most satisfactory references. Wants any position with our company in Brazil, but would prefer one on the outside. Can give bonds to any reasonable amount."

"That sounds good," admitted Forbes, "but this is the only trouble: it will take him a week to get there, and the Lamport and Holt liner sailed two days ago. Even if he strikes town a week hence, he will have to wait for the next available steamer. Meantime, we are shy a paymaster in the jungle."

"If I may suggest," began the secretary, but at this instant the buzzer got busy again.

Thwaite looked at his chief and made a motion as if to hand the receiver to him.

Mr. Forbes shook his head.

"You take the message, please. I'm too much upset about poor Payson to talk unless I have to."

"Yes," said Thwaite through the phone. "What? Repeat that name, please! Hold the wire!"

He lowered the receiver from his ear and addressed Mr. Forbes.

"This is extraordinary, sir! Deering is in the outside office. He wishes to talk to you."

"Well, I'll be hanged!" ejaculated the manager, once more halting abruptly in his restless pacing. "Talk about telepathy! Tell him to come in. He'll

never know how glad we are to see him!"

CHAPTER II.

Grateful for a Show.

IN response to Mr. Forbes's "Come in," the sanctum door opened and there entered a young man who at once caught the fancy of the secretary and the manager. That he was from the West and lived the outdoor life was made manifest by a certain breeziness and wholesomeness that he seemed to radiate.

He was tall, broad-shouldered, and walked with the easy swing that bespeaks the man who has ridden broncos for years and used long stirrups while so doing.

The bronze tan of his cheeks made the other men look sickly by contrast. He wore clothes that were unmistakably cut by a city tailor, but he carried a hat of a buff hue and an enormous brim.

There wasn't the slightest trace of embarrassment in Deering's manner as he faced the manager. Instead, there was a friendly curiosity—a man-to-man sizing-up.

Mr. Forbes, accustomed as he was to make rapid appraisements of those with whom he came in contact, concluded that the Texan was all to the good.

"Well, Mr. Deering, what can we do for you?" said the manager, as he motioned the visitor toward a chair.

"That's just what I want to find out," replied the Texan as he sat down. He spoke in a soft, low drawl. "I thank you heartily for the letters that you have written me; but a little talking is better than writing."

"And it's this belief that has brought you to New York, eh?"

"Not entirely, sir. Father imports a good many cattle. A shipment was due day before yesterday. I came on partly to look after them and partly to try my luck with you. The cattle landed in good shape. I wonder if I can land a job with your concern?"

The naive manner in which Deering put the question was in striking contrast to the way in which the average applicant for a position voiced himself that Mr. Forbes was tickled.

"I'd like to say," went on the Texan, "that I'm glad to know you, sir. They told me down home that I'd about as much chance of getting in lip-shot of you as a sick jack has with a keen-set coyote."

"Well, we haven't time to talk to everybody who happens along," Forbes replied. "If we did, we wouldn't do very much more than be always talking. But in your case it's different. We not only have your application on file, but you have put in an appearance at the very moment that we may possibly offer you a position."

Deering's eyes lit up and a slow smile showed his strong, white teeth.

"Then I'm glad I'm here, sir."

The manager thought none the less of him because he asked no questions, but waited for developments.

Without further parley, Mr. Forbes told the story of Payson and his fate, sketched Thwaite's theory in regard to the robberies, outlined the duties of a paymaster, and laid stress on the dangers that beset that functionary in connection with his work in the Brazilian jungles arising from climate, animals, and savages.

He wound up by offering the job to Deering on the understanding that he would do his utmost to run the robbers to earth and recover the stolen money.

"Not that I think you have the faintest chance of being successful," concluded the manager. "If you are there's a bonus of five thousand dollars for you. What do you say?"

The Texan rose and extended his hand to the manager. Forbes took it and they shook heartily. Thwaite looked puzzled. He wasn't accustomed to see employees hitch a hand-shake to the acceptance of a job.

"I can't find the right words to thank you for this, sir," said Deering. "It's just the kind of work that I'm cut out for. I've rounded up with greasers and half-castes and Indians, and am on to most of their ways. If it comes to a muss or two, I won't hunt leather. When do you want me to start?"

"You will take steamer to Para." Mr. Forbes looked inquiringly at his secretary.

"On Tuesday next," said Thwaite. "At Para, our own supply boat will meet you. It will take you another week or ten days—according to the weather and the Amazonian current—to reach the headquarters of our construction force at Jutupica, which is at the junction of the Manuel and Rodo rivers. If you've nothing better to do this evening, hunt up a map of the Brazils and locate the Manuel."

"I know all about the territory—that is, as much as maps and books could teach me," Deering said. "Got interested in it ever since the time that I began to get letters from one of your men there whom I know."

"Good!" exclaimed Mr. Forbes heartily. "Then you won't feel entirely a stranger when you arrive there. Mr. Thwaite will take you to our chief clerk and he will read you the terms of the contract we make with our men. If you like them you can sign on—and good luck to you."

"I allow that good luck *is* with me, and I don't propose that she gets away from me, Mr. Forbes. I'm going to let my work speak my thanks, sir, so all that I'm now going to say is that I'm sure grateful to you for giving me a show."

The business of the South American Construction Company is the building of railroads for the republics that lie south of the Caribbean Sea. For many years the Brazilian government had monopolized its resources.

The latest contract that it made with the government had to do with the opening up to trade by means of the railroad the fertile territories that lie along the shores of the Manuel River and the mineral lands in the neighborhood of the Rodo River, a tributary of the Manuel, which joined the Rodo about one hundred miles below its head of navigation. The Manuel River is one of the more important tributaries of the central Amazon.

The scene of operations of the new railroad was largely virgin forest that had never been trodden by the foot of a white man. The route was laid along the eastern shore of the Manuel and the northern shore of the Rodo.

Close to the water the vegetation dwindles to a growth of rushes, river grasses, and flowering reeds; but a few yards away there is a bewildering diversity of beautiful trees. A great tangle of vegetable giants, draped, festooned, corded, matted, and ribboned by climbing and creeping plants, confronts the railroad engineer. Here the exuberance of nature offers obstacles to human progress and industry that are nearly as insurmountable as the sands and aridity of the African deserts.

When Deering sailed for Brazil about twenty miles of the Manuel River section of the line and ten miles of the Rodo had been built. The base of operations for both lines was Jutupica. The advanced camps of the construction parties were on the edge of the primeval forest. The country roundabout was sparsely populated by Carripunas Indians, one of the largest river tribes.

Deering's trip to Para was uneventful. The ocean trip from New York to Brazil is usually like a mill-pond. The passengers were few and uninteresting, and the officers of the ship were chummy.

Arriving at Para, he found that the supply steamer Ambato hadn't arrived from Jutupica, but was expected almost hourly. Deering took a walk around the town, and in consequence revised his opinions about "greaser towns." The manifest prosperity of the city, its impressive buildings, docks, enormous wharfs, and the hustling business district, set the Texan thinking.

The Ambato made her dock about 4 P.M. Deering noticed that the railroad men among her passengers who were leaving Brazil for the North had yellow skins, and the white of their eyes were tinged with the same hue. Later, Deering learned that this was the result of daily doses of quinin and malarial fever.

Deering got into conversation with some of the pilgrims, and his optimism was sorely tried. He was told that the climate was poison to a white man. That at times the heat was unendurable. That the father of insects had his headquarters along the banks of the Manuel and Rodo rivers. That the native Brazilians were "fever-withered monkeys without tails." That snakes, swamps, and savages were the chief characteristics of the outlying camps.

"Take my advice, young fellow," said a saffron-tinted surveyor, "and beat it back North by the next steamer. You've got a liver and a life before you just now. You won't have any of the first and mighty little of the second if you cruise around these parts for a couple of months."

CHAPTER III.

Senor Guila Talks.

BETWEEN Para and Jutupica the Ambato made three stops for the convenience of passengers. Mannering, the local manager of the enterprise, was a thrifty soul who saw no reason why the Ambato shouldn't earn her coal bill by stopping at these ports.

On this particular trip there were four travelers. These included a Portuguese lumber dealer who was on his way to the Purus and Teffe rivers to purchase *estoraque* (maple) and *parnauba* (white cedar), both used for building purposes. The others were a speculator in *copaiba;* an American dealer in wild animals; and, lastly, an individual who introduced himself to Deering as an Indian trader.

This man was Spanish by birth and Rodriquez y Guila by name. Both facts he announced to Deering within the first minute or so of their acquaintance. The Texan didn't take kindly to his purring voice, his catlike gestures, or his subservient attitude. More than this, he didn't like his peculiar, patronizing manner.

In spite of Deering's attempts to avoid Guila, the latter stuck. The Texan gave short replies to the Spaniard's questions, but all to no purpose. The Spaniard, who used good English, would not be denied. He tried Deering in the language of Castile, but the American, although he spoke Spanish fluently, pretended not to understand.

"This is the *señor's* first trip to Brazil?" asked the Spaniard at length.

"Yep," admitted Deering.

"Ah! Then he has much to see and admire. It is a great country, full of the most magnificent possibilities that will flow out to the people when they are tapped by the railroads. I know, because I have been to places where few white men have been, and I have seen. Oh! yes, I have seen!"

The Texan's interest for the moment overcame his prejudice.

"Seen what?" he asked.

"The superb natural resources of this land. They are asleep, waiting to be awakened by the whistle of the locomotive. Forests of precious woods, mines, gold, silver, and what not! Trade of all kinds! Ah! the railroad is the wizard of to-day. Working marvels, miracles, wonders! Is this not so, *señor?*"

"Yes, indeed," assented Deering heartily, thinking of the prosperity that the railroads had brought to the Double S ranch. "I know of what I'm talking."

"Then the *señor* is a railroad man, eh? And, I presume, is going to Jutupica?"

"You've struck it. To take the place of the paymaster who was murdered thereabouts not long ago."

He could have bitten off his tongue the moment after he spoke the words. His thoughts were far away among the broad stretches and wooded mesas of Reeves County. He had lived long enough among certain South Americans to know that it isn't wise to tell them one's personal affairs.

The heavy eyebrows of the Spaniard raised and his face assumed an expression of shocked surprise.

"That is terrible—most terrible!" he cried. "How long since, did the *señor* say, that this took place?"

"About a month ago."

"Ah! that explains why you are the first to tell me of it. I have just come from a trip on the Upper Maranon and have not been in touch with the outside world for many months."

"Now I've told you my business, may I ask yours?" queried Deering, still angry at himself for his indiscretion.

"Mine? Assuredly, *señor.* I trade with Indians. I take a journey to parts where I have reason to believe that the white man has never penetrated or is but rarely known. I take with me such trifles as I know will please their childish minds. Then I find out what is their chief need—fishing-hooks, calico, knives, or what not. I make friends with the tribes, especially the chiefs and

witch-doctors. If possible, I become blood-brothers with them by means of tribal ceremonies. I make a date to return to them, bringing with me the things they desire, and which I exchange for rare articles for which I can find a ready market rubber, gums, rare woods, jaguar-skins, and so forth. So I live."

"Pretty risky business," commented Deering.

"Yes. Almost as much as that of a railroad paymaster in these parts."

"Where are you making for now?" asked Deering.

"The Mojos and the Urupas Indians, both of whom live on the right bank of the upper Manuel, expect me in a few weeks. That explains why I have had the felicity of making your acquaintance."

Deering knew the flowery rejoinder that the English-clothed phrase called for, but he was now on his guard and spoke it not.

"Might I ask what you are taking them?" asked Deering. "Of course, I don't want you to give away your business; but I've been given to understand by those who are supposed to know that these gentlemen who hang out along the Manuel and near-by rivers haven't any use for beads, wire, mirrors, or any other of the knick-knacks that are supposed to be dear to the savage heart. The only things that they crave are cartridges and cannibal *table d'hôtes*."

"The *señor* has been misinformed," said Guila. "They have no guns, in the first place, and they prefer fish to human beings. They want many things that the *señor* will pardon me for not mentioning."

"Certainly," said Deering

He excused himself and went to the tiny cabin that had been assigned to him—the star passenger on the boat.

The unfavorable impression made by the Spaniard wouldn't take wings.

CHAPTER IV.

Mr. Mannering Explains.

APART from the Ambato sticking her snub nose in a sand-bar and, later, being carried down a stream for a dozen miles or more by a floating island of tree-trunks, creepers, and river-grasses that collided with her one night, and the excitement caused by a half-dozen snakes that preferred her deck to the island, the trip westward was of an uneventful nature.

Guila continued his attempts to make good with Deering, and Deering, in view of his growing dislike for the Spaniard, refused to "sit in." At length Guila abandoned the job

The Portuguese lumber man proved to be a bright little chap who spoke hair-raising English with much fluency. The *copaiba* hunter was a half-breed Indian and wholly stupid. Howson, the Yankee, had been all over the world in pursuit of animals, and was chock-full of dry humor and queer experiences. He had a pet theory that the central Brazilian forests sheltered beasts, birds, and reptiles that were unknown to science, and he was making the trip to verify his belief.

He and Deering became very chummy before the steamer reached her destination. He told the Texan a number of valuable truths concerning life in the jungles.

"Remember," said Howson, the night before the boat reached Jutupica, "that when you're in these fever-bitten, snake-swarming woods, you're in the enemy's country. There must be no let-up to the lookout you keep. Insects, animals, and savages are all against you, so are most of the whites and pretty nearly all the half-breeds you'll buck up against. Cartridges in your magazine, quinin in your kit, and an open eye all the time are the essentials of safety."

Jutupica is built on a bluff that overlooks the Manuel at a point about four hundred miles from the Amazon. It takes its name from a small, flowering tree that grows abundantly in the near-by forest. Brought into being by the South American Construction Company, it attracted a population of traders, adventurers, and half breeds whose leaf and reed huts and shanties on its southern outskirts are in strong contrast to the trim frame buildings of the railroad men.

The town boasts a well-equipped hospital, a club-house, a library, church, houses for the officers, boarding houses

for the men, and a shooting-gallery. A goodly space in the river was fenced in so one might bathe and not fear the crocodile or fire-fish.

There are warehouses, freight yards, a good-sized depot, and a network of rails on which "goats" puff and pull from daylight to dark, except during the midday siesta. A busy place is Jutupica, and in startling contrast to the quiet and solitude of the rivers by which it is approached.

The arrival of the Ambato was an event. Everybody who could frame an excuse to be at the wharf when she rounded the bend in the river was on hand

James Mannering, the Jutupica manager, was on the dock to meet Deering. So was Osborn and a dozen men whom he had brought with him. In five minutes the Texan was chatting with the men as freely as if he had known them all his life.

"Mr. Deering," said the manager, "I'll walk with you if you don't mind. We are anxious for you to begin your work at the earliest possible moment, and every hour counts. So I'll talk to you on our way to the offices."

Mannering was a small, nervous man with a worried expression and the inevitable yellow on his cheeks and eyeballs.

"Certainly, sir. See you boys later," he said to Osborn and the others.

"Mr. Forbes has cabled me at some length about you," began Mannering, "and I feel sure that we found the right man in you."

"I appreciate that," said Deering.

"The next payment that has to be made to the advanced camp is a heavy one, probably the heaviest that we have had occasion to handle at one time. This is due to the setback caused by Payson's death and robbery and the additional men that have been recently sent to the front. Twenty-five thousand dollars, gold, will be given into your care

"As it is a physical impossibility for one man to burden himself with this sum, and as it *must* be carried in money-belts, we have decided to give you a companion who will share the burden with you. He is Walter Osborn. As I understand it, you and he are good friends, and we personally know that we can bank on his reliability."

Deering's face was beaming when it turned to the manager.

"This is the best news that I've heard in many moons, Mr. Mannering. Of all the men I know I'd have chosen Osborn for partner on the trip that lies ahead of me. He's New York born, but he's got the Texan grit. He was down on our ranch for six months. They thought that he was a half-way hunger when they sent him to us. But he went home as sound as a bull yearling. You can count on Wally every time!"

A smile crept over the careworn face of the manager as he listened to the enthusiasm of Deering.

"I'm glad that you're to be together, then," he replied. "I rather fancy that you two have some interesting times ahead of you. A couple of our paymasters robbed and killed and the murderers still free!"

When the officers' quarters were reached Deering met some of his future associates, and for the first time in his life drank guayusa tea and ate cuma pears and jabutepe, a fruit that looks like the foot of a huge tortoise.

CHAPTER V.

The Weight of Gold.

ON the third day after Deering's arrival he and Osborn made their start for Camp 29, about sixty-eight miles from Jutupica. Nearly twenty miles of the trip could be covered by the completed portion of the railroad, after which they would have to hike through a jungle. This was in accordance with the instructions of Mr. Mannering.

"You see," Osborn explained to Deering, "the rough work of this construction is being done by the toughest lot of citizens on the continent. We've natives, negroes from the West Indies, Portuguese, Indians of half a dozen different tribes, and the scum of the surrounding nations.

"Our foremen are all husky brutes and bristle with guns. You can understand why it isn't advisable for paymasters to get too close to the camps."

Accompanying them was a half-breed named Pama Nanegele, who acted as *moso*, or guide. He was a tall, good-looking fellow whom Deering christened "Pam."

Pam spoke the dialect of several Indian tribes that lived in the district through which the route lay.

Another in the party was a Mundurucus Indian who rejoiced in the title of Pamari-tu, meaning fire-flame. His duty was to hunt and scout for the party.

The Mundurucus are one of the comparatively few Amazonian tribes that are friendly to white men. They are fighters, and cultivate their land when they are not at war or hunting big game. Tu, as the Mundurucus was nicknamed by Deering, was a silent, stern-faced chap with broad shoulders and finely developed arms and legs. He was armed with bow and arrows and a broad-bladed spear.

He had in reserve a ten-foot blowpipe and an assortment of tiny darts cut from the leaf-stalks of a certain palm, winged with a tuft of silk-cotton and tipped with *urari*, a poison made from the juice of certain herbs known only to the Indians.

Pricked by one of these darts, an ox will die in twenty minutes, a man in ten, and a monkey in five or less. A parrot hit by one of them falls immediately.

Deering and Osborn carried rifles and automatic pistols. Pam carried two revolvers of the vintage of 1880. Loaded bandoliers and a hundred reserve rounds for each arm constituted the ammunition of the white men.

Coffee, biscuits, and sugar formed the bulk of the weight in their knapsacks.

Tu was relied on to furnish all of the meat and most of the vegetables. If you know your jungle, you need never run shy of fruit and green stuff of an edible sort.

The money was carried on the persons of Deering and Osborn in money-belts that fitted around the waist and hung, suspender fashion, over the shoulders. Even then it was found necessary to stow some of it in the knapsacks.

"I'm a gold-plated party, so I am," chuckled Osborn, as he buckled the last belt over his shoulder in the private room of the manager just before the start.

"Same here," responded Deering, wiping his streaming forehead, "and I'm betting that before we get through we'll savvy the burden of wealth. Woof! this is some warm!"

An engine and special car took the men to the end of the completed line, where they disembarked. Then Pam struck to the eastward at right angles to the right-of-way, following the left bank of a little stream that joined the Manuel River at this point.

As it was Deering's first view of a Brazilian forest at close range, he was duly impressed by the height of the trees, the lavish luxuriance of the creepers and lianas, the beauty of the flowers, particularly the orchids, and the unceasing chatter of monkeys and screaming of parrots out of sight in the tree-tops.

For six or seven miles the men pursued their eastward way, the edge of the stream offering fairly easy going; but back from the water was the forest, its walls of closely growing tree-trunks and its lower interlacing of creeping plants forming a barrier that was impossible to penetrate without the aid of the machetes that Pam and Tu carried.

A little brook from the south emptied itself into the stream. Pam, with a wave of his hand, took to its sandy bed, the others following. Very beautiful was the cool green vista punctuated by clumps of vivid color, where intensely scarlet and gleaming yellow orchids clung to boughs and trunks.

Twice within the hour that followed brilliant-feathered macaws flitted across the brook like animated rainbows. A tapir crashed from the underbrush and splashed through the water. Insects bit and buzzed and stung, and Deering lost all interest in the surroundings while he battled with the pests.

It was well into the afternoon when Pam called a halt until morning. The white men were by no means sorry. The heat of the forest and the weight of the gold sapped their energy.

Pam and Tu set to work to build a hut. Lianas were cut, their ends sharpened and stuck in the ground, and a

central forked stick supported them where they crossed each other.

Then Tu ascended a palm-tree with the ease of a monkey, and soon its leaves began to fall. These were interwoven in the liana stems. In less than half an hour a comfortable hive-shaped hut was finished

Tu exchanged a few words with Pam.

"He go hunt," said Pam to Deering. "You take sleep."

Tu, armed with bow and arrows slipped like a dusky shadow into the jungle. The white men crawled through the hole in the side of the hut that answered as a door. Knapsacks served as pillows. The interior was comparatively free from insects, and it wasn't long before they were asleep.

It was three hours before Tu returned with a good-sized armadillo, two turtles, and a cigana—a Brazilian pheasant. These Pam took with a grunt of satisfaction. Then the natives jabbered for five minutes.

Deering, awakened by the chatter, wriggled his way out of the hut and waited the result of the confab. Pam turned to him:

"Tu say men—four, five—in jungle close by. Footprints look like Piros Injin, he say, but not sure. Looks like they been close to camp. Now gone off there!" He pointed to the east.

"Nothing in that, is there?" asked the Texan. "There's no reason why they shouldn't be friendly?"

Pam gave the shrug of his shoulders that he had inherited from his Portuguese father.

"Nothing friendly in jungle," he muttered, and no more was said on the subject.

Pam was a forest cook of no mean ability. Armadillo roasted in its shell, turtles roasted and served with the acid juice of a fruit that Tu located near by, and broiled pheasant did credit to his culinary skill.

"You rest up," said Pam at the end of the meal to Deering and Osborn. "First day all some hard. To-morrow you go better easy. We camp here to-night."

"Good," cried Osborn. "Pam, you're a brick. Consider yourself an honorary member of the Humane Society."

"Me not know what you talk," replied Pam. "No good waste talk like you do."

Deering lit his pipe. The mosquitoes having calmed down, he turned to stroll in the direction of a little glade that led from the brook into the forest. It was moonlight, but only an occasional ray penetrated the thick canopy of boughs and leaves, making the shadows doubly dark by way of contrast

"Where you go?" called Pam sharply.

The Texan turned. "Not far; just one pipe's length." He pointed to his calabash. "When that's empty I'll turn back."

Pam shook his head. "Too much far. You look out. Jaguars. Injins, mebbee, too. *Sutanos* (ghosts) many and eat men."

"They'll find me a tough proposition to chew on," laughed Deering. "I'll take care of that."

"All say same. All seem think mozo fool," retorted Pam.

Deering smiled and walked slowly toward the glade. The untranslatable sounds and weirdness of the night forest appealed to him. In the distance he could hear the fiendlike voices of a congregation of guaribas, or howling monkeys. Bats flitted by him in a continuous procession. Once he caught the agonized cry of an animal that had fallen victim to a prowling enemy.

From the farther end of the glade came a sudden burst of exquisite song that thrilled him to the heart. It was more like the tones of a cello than the notes of a bird. Enthralled, Deering listened, creeping cautiously toward the spot from whence the music proceeded in the hope of getting a moonlit glimpse of the musician. His ears were being ravished by the rare realjo, or organ-bird, that sings only at night.

Abruptly the song stopped and Deering heard the hasty flutter of wings. With an unflattering remark about his clumsiness, he drew under the shadow of a clump of trees and waited in the hope that the bird would return. A minute or so passed in silence

Deering thought that he heard a slight rustling to his left. As he turned to investigate he felt a heavy blow on his left breast.

At the same instant strong arms were

thrown around him and he was flung to the ground.

CHAPTER VI.

Meeting the Piros.

THE Texan did not struggle. Instead and in accordance with a trick that had been taught him by many rough-and-tumbles on the plains and elsewhere, he lay motionless.

By slow degrees the arms that enwrapped him were loosened and the knee that was planted on his chest was withdrawn.

Then he got into action. Clutching the throat above him, Deering dug his knee sharply upward, catching his assailant full in the abdomen.

As the latter gasped with pain the Texan threw himself to one side, still holding on to the throat of the other.

This gave him the upper hold. Then his hand shot to his holster and the man underneath felt the muzzle of an automatic pressed to his forehead.

"*Ti-sak!*" he yelled gaspingly. This is the Piros word for "help!"

As if in answer, a sinewy arm was thrown around Deering's neck from behind and tightened until he almost choked. The Texan knew that he was being garotted in Spanish style and fought desperately to free himself.

The arm held, however. Clouds of black and crimson began to float before him and recurrent waves of unconsciousness swamped his senses.

Instinctively, his finger pulled the trigger of his pistol, but it seemed to him as if no report followed.

Then there was a dazzling blaze of light that was swallowed by profound darkness—and he knew no more!

When he came to himself he was lying in the moonlight on the edge of the glade near the brook. Pam and Tu were bending over him. Tu was holding in his hand the leaf of a tree that he had turned into a goblet.

"Drink," said Pam, motioning to Tu. The Indian put the leaf-cup to the lips of Deering, who drank feverishly. There was an aromatic taste to the water that seemed to pass into his veins. It stimulated him, and he was able to sit up.

Pam grinned and Tu grunted approvingly.

"Parica water good!" said Pam. "Make dead man sit up! Make sleepy afterward. You get to tlato (hut). Sleep. All right, morning."

Deering knew that he had been given a dose of the famous parica, the stimulant, with the aid of which the Central Brazilian Indians and their dogs perform miracles of strength and endurance.

"But where are the fellows who tried to do me up?" asked Deering, as he got stiffly on his feet.

"One dead — lying there." Pam pointed to a dark huddle a little distance away.

"Tu —he do killing with spear. I tell him to follow you; keep you in sight. When he see men jump you, he whistle for me and kill man on top. Other run, but think Tu get him in leg with arrow. Next time you do what mozo tell. Mozo no fool, eh? Now, you go to tlato; sleep much."

"It's I am the fool," acknowledged Deering frankly. "And I don't want to go to sleep. *Caballero!* Too much wake in the eye, you savvy! I'll sit up and swap yarns with you and Tu, or go on the trail of these bush-rustlers!"

"Parica talk, not you," was the placid reply. "You go lie down or we carry you to tlato."

"Oh, well, if it's scrap or sleep, I'll choose the peace proposition," said Deering, as he prepared to move on. "And what's this?"

His hand had found a jagged cut on the left breast of his khaki shirt.

"Piros Injin that Tu killed—try get you that way," said Pam coolly. "No good. Knife must have hit rib. Funny thing no blood!"

Deering passed his hand over the cut once more. Then the truth flashed on him. One of the gold-filled pouches of the shoulder-belts had received the blow that was intended for his heart, thereby saving his life.

"Yes?" said Pam.

"Lucky the rib was there, wasn't it? If it hadn't been on the job you'd have had a forest funeral."

He did not think it well to tell the facts of the case even to Pam.

"Much worse—much," replied Pam gravely. "Pam then lose work as mozo."

The Texan laughed. "So that's why you are so frozen on getting me through as a sound beef, eh?"

The sharp crack! crack! crack! of a repeating rifle in the direction of the tlato cut short his utterances.

Tu lifted his head like a questing hound. Pam stood with tensed muscles and ears. Deering drew his automatic and fired shot after shot in the air.

Then he made for camp on a dead run, followed by the others.

In a few minutes they reached the hut. The moon had cleared the tree-tops that earlier in the evening had shadowed the camp, and now shone full and bright on what remained of the hut.

It was crushed and flattened. In the midst of the ruins the face of Osborn was discernible, the light of battle in his eye, and a rifle in the hand that stuck through the palm leaves.

"What's up?" queried Deering.

"I don't know, but our villa's down," replied Osborn, glancing at the ruins. "I wasn't aware that the business of house-wrecking flourished in these jungles, but it does, all the same."

"Quit your fooling and tell us what has happened," said Deering.

Osborn crawled painfully between two lianas that had twined themselves lovingly around his neck and shook from his head and shoulders a score or more of palm leaves.

"I was dozing peacefully, in spite of the piums, when I heard low voices outside that didn't seem to me to have a Texan twang or the soft-nosed jabber of Pam or Tu.

"So, Deering, peeking between the leaves, I observe, in the first place, that all the rest of you are absent; and, in the second, that I've never been introduced to the brace of parties whom I can dimly make out squatting beneath the bush yonder. This I know because you don't talk as if your upper teeth were trying to usurp the functions of your tongue. And, again, I smelled the visitors—the wind blowing from them to me.

"While I was pondering on the next part of the program the visitors rose and began to make a strategic flanking movement toward the hut. As they passed through a belt of moonlight I felt wabbly beneath the belt as I gazed on the bunch of wicked spears they bore. I had barely time to grab the rifle when they simultaneously made a running jump for our mansion, landing on its roof and wrecking it as you see.

"As they started to run I began to fire. Didn't aim at anything in particular, but just tugged at the trigger and let her roar. The effect on those men was phenomenal. They fled."

"But what could have been their object in jumping on the hut?" asked Deering.

"I figure it out this way. They knew that I was the only party in camp and that I was in the leaf-built beehive. They concluded that I was snoozing and that if they waked me easylike it would be nickel-plated pills for theirs. So they decided to jump the claim and jab me as I twisted in the liana tangle."

"All your fault," broke in Pam, turning to Deering. "He left alone 'cause of you. Next time you do as mozo tells."

"You bet I will," replied the Texan heartily.

"Then you turn in soon as Tu mend tlato."

"That goes," said Deering with a yawn. "I begin to feel like snoring. My neck's getting some stiff."

"Parica dying in you," chuckled Pam. "All right by morning."

Ten minutes later Deering and Osborn were stretched on their beds of tree-twigs in the hut, Pam keeping the first watch of the night on the outside.

"Harry," said Osborn, rousing himself with an effort, "what do you think of it?"

Deering paused before replying.

"My opinion is that we've only begun with these coyotes. They are aware of the freight we have in our belts."

CHAPTER VII.

Up a Tree.

WITH the first flicker of dawn the mozo aroused the sleepers. Deering was stupid and drowsy from

the combined effects of the drug and his struggle of the night before. His neck was swollen, and around its center were black and blue bruises, souvenirs of the attempt to strangle him.

A breakfast of coffee, roasted plantains, and cold pheasant banished his listlessness. And when Tu disappeared in the forest, to emerge presently with a bundle of leaves which he crushed and applied as a poultice, Deering felt as fit as a fiddle.

"Now, I go first. You two *señors* come close behind. Tu, he walk behind," ordered Pam, as they took up the line of march.

It was not long before they reached the spot where the attempt was made to assassinate Deering. The body of the dead man was gone. Tu, who examined the grass and surroundings, declared that it had been removed by men and not by carnivorous animals, as Deering suggested.

Around the tree-roots, where the undergrowth was comparatively thin, Tu picked out the footmarks of the assailants, although to the white men's eyes nothing was visible.

The prints, the Indian unhesitatingly avowed, were those of a Piros Indian. So, too, were others in front of the tree-clump, evidently made by the aborigines who had picked up the body.

There were traces of yet another person, but Tu frankly admitted that he couldn't translate them to his satisfaction.

They trudged on silently for half a mile or so, when Pam stopped abruptly and raised his hand above his head in token for the others to halt.

"*Cuche!*" he called back without turning his head.

Deering ranged to his side, as did the others.

"Peccaries," cried the Texan, as his eyes fell on a line of small dark forms passing in front of them and hardly visible above the high brush. "Who would have thought of seeing them so far from home!"

"Roast pig isn't half bad," said Osborn. "We'll have some for supper."

He threw his rifle to his shoulder. Simultaneously, Deering's hand struck up the muzzle of the weapon and Tu tore Osborn's finger from the trigger.

"What are you fellows up to?" cried the indignant New Yorker. "Tu, you mud colored brute! you take liberties with my hand again and I'll—"

"Keep quiet!" broke in Deering. "Don't you know by this time that if you so much as flicked an eyelash of one of those peccaries, you'd have dozens of them on you, ripping up your legs and body with their little tusks! See the old boars rounding up the stragglers and keeping an eye out for happenings? They'd start the trouble and the rest would take a hand!"

Osborn turned a trifle pale.

"I remember the tales I heard about them when I was on the ranch," he began, "but I didn't take much stock in them. So it's true, then?"

Before the Texan could reply to the query several of the peccaries gave vent to agonized squeals and fell, writhing, out of sight in the undergrowth. Almost at the same moment the flanking boars wheeled in the direction of the party, lifted their heads, snuffed the air, and uttered shrill, vicious grunts. The rest of the number, as if obeying a common impulse, did likewise.

"Take to trees!" screamed Pam.

He set the example by leaping at the low-growing boughs of a near-by jucatree. Tu followed up the same tree. The white men started to run for a pao-bush, or Brazilian ash, the only other tree in the neighborhood whose branches grew within reach. Even as they turned and fled they could hear the clicking and clashing of the tusks of the infuriated pigs.

Osborn was the first to reach the goal, for the Texan purposely covered their retreat. Osborn grasped the nearest overhead bough and tried to pull himself up. His efforts were useless, however. The weight of the gold that he carried was too much of a handicap.

"Hurry!" cried Deering. "Those squealers are close on us!"

"I can't do it, Harry," gasped Osborn; "the belt is keeping me down!"

Deering glanced in the direction of the oncoming peccaries. They were only a few yards away.

The Texan could see the angry sparkle in their eyes and the foam flying from the roots of their snapping tusks.

"You've got to do it!" he cried sternly

He drew his automatic and crouched close to the tree-trunk.

"Now, Wally, you use my back as a stepping-stone. When you get upstairs, lend me a hand!"

Osborn did not hesitate about obeying. He had scarcely reached the bough in safety when the foremost boar made a spring at Deering with the agility of a cat.

A bullet met the peccary while he was still in the air, killing him instantly. But so close was he to the Texan that the body struck Deering full in the breast.

Two other beasts rushed at him, their jaws open and their keen tusks gleaming. Deering, the owner of that rare temperament that grows more self-possessed with increase of peril, deftly shot the first of the peccaries and kicked the other full in the mouth as it reached him.

Then he opened fire indiscriminately on the nearest of the herd.

At the same instant the automatic of Osborn began to speak. The rush wavered, checked, and halted

"Reach down your hand, Wally!" yelled Deering.

Osborn obeyed. As the Texan began to ascend the peccaries recovered themselves and rushed to the attack again. The tusk of one of them touched the sole of his heavy boot, gashing the stout leather from heel to toe-tip.

"Some warm work," he said, as he looked down on the squealing, grunting, jumping animals below. He filled the magazine of his pistol.

The New Yorker was white to the lips

"My God, what a narrow escape you had, Harry!" he managed to say. "And all because you made me use your back as a footstool."

"Well, I'm here, and that's the chief thing I'm wondering what set the pesky critters going for us. Never knew peccaries to attack people out of sheer cussedness. Maybe the Brazilian beasts are different from the kind we get at home. What are you going to do, Wally?"

Osborn was unslinging his rifle.

"I'm going to thin out the pig population hereabouts," he replied. "It's too numerous and sassy."

"You let that old gas-pipe of yours continue to dangle from your back," said Deering firmly. "It's astonishing what you city folk don't know about wild pigs. The more mad you make this gathering, the longer it'll occupy the convention hall. As it is, I don't look for them to disperse peaceful for a couple of hours. If you get your gun a going we'll have to perch here like a couple of love-birds until Christmas."

The men settled down on the big bough as best they could and waited events. They discovered that Brazilian trees harbored things that bit and stung and scratched as enthusiastically as did the flying and crawling creatures of the lower growth, and the longer they waited the more they slapped and scratched. Their tormentors seemed to multiply with the passing of the minutes.

In an hour some of the peccaries began to get restless and rooted in the underbrush for food, finally straying off into the forest. Others followed their example. By degrees the movement spread until only a few big boars remained. At length they departed with menacing grunts.

As the last boar disappeared in the shadows of the jungle the voice of Pam was heard from his roost.

"No come down just yet!" he called. "Wait fifteen minute. Old peccaries watching see what we do!"

It was, indeed, as he had said. Deering's eyes, following the direction of the *mozo's* forefinger, could just make out a half-dozen vague shadows standing in sentinel fashion on the edge of the thicker forest.

"No talk. Keep quiet till I tell all right!" added Pam.

An interval elapsed during which Deering and his friend whispered their opinion of jungle beasts. Then Pam gave the blessed signal and they scrambled to the ground, stiff and sore.

CHAPTER VIII.

Pam's Diagnosis.

TU was already on the spot where the peccaries were first sighted, quartering the ground with the patience and

thoroughness of a bird-dog. Presently he halted, beat down, took another short inspection, and then waved his hands to the others.

"He find something tell why peccaries go mad," explained Pam, as the others hastened to join the Indian.

Tu was standing over the bodies of two of the beasts. In the case of one of them a broad-bladed arrow had gone clean through its heart. In that of the other a similar missile had struck it clean in the throat, and yet another had penetrated its lungs. In both instances death had been practically instantaneous.

Tu placed the animals in the positions they must have occupied when struck, for peccaries feed with their heads all in the same direction.

It could then be realized that the arrows had come from a point to the rear and slightly to the left of the party!

Pam translated the meaning of it all in his own fashion. He said that the bowmen must have known that he and the others were on the spot, and that the peccaries were shot for the express purpose of inciting the rest to attack.

The jungle Indians rarely use their bows at a range longer than twenty-five feet, and as the Deering party hadn't curbed their conversation in any way on the march, their voices must have been heard in the silence of the forest at a distance of a double bow-shot length.

"Does Tu know the brand of arrow?" asked the Texan.

"He says Piros sure. War arrow, not hunt arrow."

"But if the Piros were so close and wanted to bump us off, why didn't they use their arrows on us instead of the wild pigs?" Osborn asked the *mozo*.

Again Pam turned to the Mundurucus and talked with him at some length.

"Tu say that Piros now believe you white men have so strong witch-medicine that no good try kill you with spear or arrow. Tu say Piros think this 'cause knife no good on you other night."

Pam nodded at Deering. "Tu live one, two year with Piros; know what they think inside," he continued, tapping his forehead.

"I hope that nothing will occur to make them change their minds about us," chuckled Deering. "Some good comes of carrying money on your person. A supposed cast-iron body is apt to be useful in these parts."

"All same, if Piros get hold of gun, he try he luck again," suggested the mozo.

"Does Tu say so?" asked Deering.

The Indian and the half-breed jabbered together for some moments. Pam turned to the Texan.

"He say that Piros think that gun is medicine that is too strong for any other kind of medicine. If he gets chance he sure try shoot you with gun."

"Cheerful outlook," growled Osborn as Deering smiled his slow smile.

"If we see the Piros first, there won't be much shooting done by the gentry," he said. "Ask Tu if he ever knew them to use peccaries as means of vengeance to wipe out an enemy—before this?"

Pam put the question. Tu shook his head emphatically.

One of the slain peccaries was dressed. Tu slung the carcass on his back, and the march was resumed until a halt was called for luncheon.

Then a fire was built and loin chops from the wild pig skewered on long twigs of the copal-tree were placed over the glowing embers with the aid of forked sticks.

As the musky odor of the roasting meat struck Deering's nostrils a deadly nausea seized him, followed by the sensation of ice-water coursing down his spine. The chills were succeeded by ringing in his ears. A sickening faintness and a yellow mist seemed to envelop surrounding objects. He sank back on the ground with a gasping groan.

Osborn sprang to his side.

"What's the matter, old chap?"

"No use speak," interposed the practical Pam. "Get *quino-quino* instead. He got *terciana* (fever). Too much march."

The quinin-bottle was brought, and Osborn, who was quite familiar with its use, made Deering swallow some twenty grains.

"First time he have him, eh?" queried Pam.

"Yes."

"Then he have him pretty bad till to-morrow. Must make *tlato*, so him rest. You give him *quino-quino*?"

"You bet I will!"

The dinner preparations were suspended while a hut was being built. When it was finished, the semidelirious patient was placed inside. Brazilian fevers get in their fine work in a short space of time.

"I go watch while you eat," said Pam. "He likely tear things up."

It cannot be said truthfully that Osborn enjoyed his peccary. Under the best of circumstances, freshly killed meat is liable to be tough. When, in addition, it has a weird flavor of musk, it hardly recommends itself to the palate of a white man.

The musk-gland of the peccary should be removed as soon as it is killed, so Pam explained. In this instance a couple of hours had elapsed between the butchering and the cooking.

No wonder, then, that Osborn turned from pork to plantains and bananas.

During the rest of the afternoon Deering grew steadily worse. Toward nightfall he became violent, and it was much as Pam and Osborn could do to keep him in the *tlato* and force the quinin down his throat. At midnight, however, there was a change for the better. His temperature went down suddenly, and a drenching perspiration brought him further relief.

"Better now," said Pam. "He go sleep now. You lie down, I keep watch."

"Pammy, old boy, this isn't playing it square! You were shy on slumber last night. You ought to have your full dose to-night. I'll play sentinel and nurse while you sleep."

The mozo looked at Osborn in puzzled fashion.

"You fool-talk some more. What you mean?"

Osborn grinned good-naturedly.

"My fault," he said. "Forgot that you don't know United States as she is spoken on Broadway. You sleep then; I watch."

Pam looked doubtfully at him.

"Can keep 'wake for two, three hours?" he asked.

"Sure," replied the other. "Won't bat an eye until to-morrow morning, if needs be."

The *mozo* pulled out an old-fashioned silver hunting-watch and looked at its dial.

"Twelve 'clock," he said; "you keep 'wake till three. Then I come."

About one o'clock the next morning Deering awoke.

"I'm here, Harry," said Osborn softly.

"Give me a drink, please, and I'll down some more quinin."

"How d'ye feel, old man?"

"Better much better; but mussed up inside and in my head."

"Naturally; but you'll be all to the paprika in the morning."

"Wally, I've been thinking about the peccaries," went on Deering weakly, after the drink and the long pause that followed.

"'Course you have. I expect to dream of them. Now lie back and go to sleep again."

"And I've come to the conclusion that the peccary job was put up on us by somebody else than the Indians," went on the Texan, ignoring his friend's advice.

"From what I know of poor Lo, he's too thick-headed to concoct such a clever scheme on the spur of the moment. It would take a white man's brain to do that."

"Harry," said Osborn, "I'll agree with you in any darned theory about pigs or philosophy you care to advance, provided you'll take to the hay. Let everything go until the morning."

"I'll try to," murmured Deering, turning on his side. In a few minutes his deep breathing indicated that he had kept his word.

CHAPTER IX.

Friends from the Jungle.

PAM relieved Osborn promptly at three o'clock. Nothing of an unusual nature occurred during the rest of the night. Morning found Deering so far recovered from the fever attack that he was prepared to resume the march in spite of a swimming head and rather wabbly legs.

"I wonder what new devilment will

be sprung on us to-day?" he said to his chum, as, after breakfast, the expedition got on its way. "We'd feel lonesome if something didn't happen."

"We might be lonesome; but we'd be happier without such interference," replied Osborn. "This idea of somebody laying for us all the time is beginning to get on my nerves. Sneaky lot, too. Why don't they try to rush us in the open or gobble us up by weight of numbers instead of firing from cover or making pigs do their work?"

"Up north, a greaser or an Indian will never risk a hole in his skin so long as he can take to cover," replied Deering. "I allow that they're no different in these parts. Likely enough, the only chance that we've had of seeing the face of one of these pests was given us by Tu."

"Meaning the one he ventilated with his spear?"

"Yep."

"Harry," said Osborn slowly, "we must have been under their eyes from the time that we left the train up to last night."

"And now," added Deering, "I'm not cherishing the fond delusion that we are being watched as we talk. They are peeking from the jungle now! Hullo! what's the trouble with Pam?"

The *mozo*, who was leading the little procession, halted suddenly. He was gazing fixedly at the liana-covered trunk of a tree in front of him. The others, looking in the same direction, could at first see nothing but the gloomy foliage with which the trunk was covered.

Presently a long line of this foliage seemed to detach itself slowly from its background of green and move outward with an undulating movement.

"Boa!" cried Deering. "And a big one at that! Ugly brute, isn't it?"

"Ugly? He's sickening!" cried Osborn. "But don't he match up wonderfully with the lianas?"

Pam turned his head inquiringly toward the white men.

"You see all you want?" he asked.

Deering nodded. The *mozo* put his rifle to his shoulder, took careful aim at the swaying head of the reptile, and fired. There was a thrashing among the lianas as the coils of the boa unloosened themselves. The huge creature lay writhing on the ground. Pam decapitated it with his machete.

"Skin make fine belt-purse," he said. "You can wait, *señor?*"

The Texan, to whom the inquiry was addressed, nodded assent. The *mozo*, assisted by Tu, proceeded to strip the boa of its overcoat.

Just as they had finished the job there came from the forest, to the right, a long, quivering cry that even to the unaccustomed ears of the white men seemed to be fraught with a plea and a question.

The Indian and the half-breed leaped to their feet and looked at each other. Again came the weird cry. The men exchanged a few rapid words. Then Tu threw back his head, opened his mouth, and gave a sonorous yell that echoed down the aisles of the jungle.

When the yell was completed Tu and Pam dropped their machetes and each plucked a handful of leaves from the nearest bush, which they held above their heads, waiting.

"What's this, Pam?" queried Deering.

"Carripunas Indians want make friends," explained Pam rapidly. "No talk now. Put down guns, please!"

"Sure this isn't a trap?" asked Osborn doubtfully.

"Pam know, *señor*," snapped the half-breed.

The rifles of the white men were laid on the ground in accordance with Pam's wish, and all eyes were centered on the point from which the cry had come. The wait was not for long.

Ten or fifteen yards away the forest growth thinned somewhat. Into this partial clearing there glided in catlike fashion a half-dozen Indians, naked save for a breech-clout and an armlet of golden-hued wood.

In their right hands they bore a bunch of green leaves; in their left, bows and arrows, points downward in token of peace. The leader wore a parrot-feather in his hair above his right ear.

They were small, pot-bellied, and altogether homely, with thin, hungry faces that didn't match their abdomens by any means. There was something so wo-begone in their countenances that Deering was startled.

Pam addressed the leader, and a rapid chattering ensued, at the end of which he turned to the Texan

"They very hungry and want boa to eat," he explained. "Bad luck hunting. Pretty near starve. Want to know if we peon-hunting."

Pam referred to the man-hunters who, not so many years ago, were in the habit of catching Indians and selling them to foreign contractors

"It's your snake to do as you like with, but I'd certainly give it to them if I were you," said Deering. "And be sure to make clear to them that we've no use for the peon pests."

Pam nodded, and once more broke into a string of chuckling gutturals and queer chirpings. At the end of the talk the Indians laid their weapons on the ground. Those who had spears stuck them, point downward, in the earth, and all came slowly forward to the carcass of the boa. This the chief proceeded to cut up into chunks, throwing piece after piece to his followers.

After the snake had been thus disposed of, the chief turned to Deering and passed his hand thrice before his face in token of thanks. Then he motioned to his band and started for the forest.

"Tell 'em to stop, Pam," ordered the Texan, "and ask 'em if they'll have a smoke."

Pam obeyed, but not without a remonstrance about wasting good tobacco on Carripunas.

"Of course he say 'yes,'" Pam remarked disgustedly.

Deering distributed cigarettes among the aborigines, giving a whole box to the wearer of the feather. The chief broke out into a series of short, jerky sentences, directed partially at the Texan and partially at the other Indians, after which they picked up their weapons and vanished as suddenly as they had appeared

"What did he say?" asked Deering of the *mozo*

Pam grinned. "He say you the finest white man he ever meet. Your name among Carripunas now 'Man with Open Hand.' He pass word along river, you be treated like brother. If they have man-meat in camp when you come—"

"What!" Deering's voice bespoke his horror.

"Sure," continued Pam coolly, "most Indians here eat man who is enemy. If they have him, you get inside cut of thigh."

Deering did not reply. He was watching the deft way in which the half breed and the Indian were packing the green skin of the boa. They had sprinkled its interior with the pungent leaves of a shrub that Tu had gathered close by, and which, so Pam explained, would keep it sweet indefinitely.

Suddenly Tu stopped work, said a word or two to Pam, and both men snatched up their weapons and looked fixedly and fiercely at the jungle behind them.

The eyes of Deering and Osborn turned in the same direction. To their astonishment, they saw emerging from the tangle of trees Guila and four or five Indians. The Indians were bearing big bundles on their heads. The Spaniard smiled the sleek smile that the Texan hated so heartily.

CHAPTER X.

Marching Together.

"HO, *señor!*" cried Guila, as he removed his sombrero and made a sweeping bow to Deering, "this is the day of my fortunate star! A jacamars flew over our camp early this morning, so I knew that good fortune was in store for me. Behold, it has come!"

He bowed again, placing his hand over his heart.

"Who is this dancing-master?" queried Osborn in a low tone.

"I met him on the Ambato," replied Deering softly. "I've no use for him" He raised his voice to address the newcomer.

"This is unexpected Where are you making for?"

"The upper waters of the Manuel. The tribes there are expecting me. The bundles on the heads of my bearers contain that which the Indians desire"

He and his party were gradually advancing as he spoke.

"Oh," said the Texan. "Well, I hope you'll have a profitable trip."

"I have not the happiness of knowing the *señor's* estimable companion," he said. "In the jungles all white men are friends on sight. Nevertheless, I should prefer to be introduced, if I may be so honored."

This time he bowed to the New Yorker.

"This is Mr. Osborn, Señor Guila. He is associated with me in a professional way."

Osborn nodded in a perfunctory fashion. Guila made a magnificent salutation, in which the sombrero played a leading part.

"Señor Deering is happy in possessing so agreeable a friend and associate," said the Spaniard. "But few forest travelers are so charmingly attended."

Osborn felt a twinge of disgust at this fulsomeness.

"You seem to be the only one of your party who goes heeled," said Deering as he pointed to the rifle and revolvers that the Spaniard bore and the empty hands of his Indians.

Guila raised his hands in remonstrative fashion.

"We are peaceful traders, *señor*," he answered. "I come to buy and sell, not to rob or kill. My patrons, the savages, know this, therefore we are safe and have no need of many guns. These I carry to get food or protect us from jaguars."

"I hope that luck will go with you," said Deering. "We must be on our way. We have a long journey ahead."

Guila did not get a move on, however. Instead, he looked inquiringly at the Texan, smiling oleaginously.

"If the *señor* and his party are making for the upper end of the railroad, as it is to be presumed, they are going in the same direction as myself. Would he object to my accompanying him? It is good to have felicitous society in the desolate jungle."

The natural hospitality of Deering had a tough struggle with the intuition of trouble that sprang into life as the Spaniard spoke. Deering paused before replying. Then he hit on a compromise.

"I don't own the jungle, *señor*, and you can travel through it on any line you please—far or near us; but if I see any sign of bad blood between your men and mine, I'll have to ask you to travel without our company."

The Spaniard was profuse in his thanks. He said that he had his Indians under perfect control. They knew they would be severely punished if they started trouble.

"I shall now tell them as much, *señor*," he added.

Calling sharply to the aborigines, he spoke half a dozen sentences to them. Two of them didn't seem to be affected. The other three trembled and bent their heads in precisely the same fashion as does a dog when being soundly rated by its master.

"By the way, you haven't any mules back in the jungle, have you?" asked Deering.

"Assuredly not. Why the question, *señor*?"

"That snake-whip you carry? What do you use it for?"

"That is what I call a stimulator. If my Indians get lazy or impudent they taste of the whip. It does what you call—the trick!"

The whip was of rawhide, with a copper wire snapper; a formidable weapon in the hands of an angry man.

"Just a final word, Guila," said the Texan. "You had better keep your camp separate from ours. There are reasons that I don't feel called on to explain why this is advisable; but we shall be glad to see you when we are on the march."

"As the *señor* pleases."

Once more the sombrero was flourished till the brim touched the ground.

Deering and Osborn moved to where Pam and Tu were putting the finishing touches on the boa skin, preparatory to rolling it up. The *mozo* looked up as the white men approached.

"No like him," he said, nodding in the direction of the Spaniard. "Not glad he come with us."

"Then you heard?"

"Pam got jungle ears, same as Tu. Hear grass grow; hear mouse underground. Hear him tell lies to you."

"What were they?" asked the Texan.

Pam went on to explain that while Deering and the Spaniard were talking Tu had casually approached the In-

dians, who had set down their burdens and were resting. There were two Piros and three Carripunas. Tu got into conversation with the Piros, during which he had managed to feel the exterior of the bundles.

He detected the presence of bows and arrows, pricking himself with the point of an arrow that protruded through the fiber wrapping.

"Got no use for liar!" declared Pam at the end of his narration.

"Did Tu get next to why the Carripunas seem kind of down in the mouth?" asked Deering.

The *mozo* shook his head

"No. Piros wouldn't talk. I think this—"

A scream of agony put an end to the conversation

Guila's party had just gotten under way, when one of the Carripunas, a poor, half-starved wretch who walked with a limp, stumbled and fell. Before he could rise again the lash of the Spaniard's whip curled across his naked back, a trickle of blood oozing from the long welt.

The Indian jumped to his feet as he screamed, and shot to the fore. Guila looked around at Deering and smiled savagely.

"I'm going to give that brute a taste of his own whip!" snapped Osborn

Deering caught him by the arm.

"I'm the boss of this outfit!" said Deering sternly. "It's up to me to ladle out justice. If that chucawallo uses that bull-tickler again I'll see to him."

Osborn glanced at his friend. The Texan's face indicated that he meant business.

A little later Deering's party got in motion. It was a hundred yards or so at the rear of Guila's, whose men were ever and anon lost in the shade and dense growth of the jungle.

Half an hour passed without incident, when there suddenly arose from the forest ahead a repetition of the excruciating cries. Both parties were separated by the tall undergrowth.

"Come on!" cried Deering, breaking into a run and unbuckling his pistol-holster as he did so

The cries continued, growing more piercing each moment. Guila, swinging the whip furiously, was standing over the unfortunate Indian, who was lying in the brush.

CHAPTER XI.

Pam, the Interpreter.

DEERING didn't parley. He dashed at the Spaniard, caught the whip in his hand, and sent his right fist full on Guila's jaw. He repeated the blow till Guila was dazed and reeling.

Then the Texan snatched the revolvers from the Spaniard's belt, emptied the chambers, and threw the weapons at Guila's feet.

Meantime the Piros were muttering to themselves and were handling their bundles in a manner that didn't meet with the approval of Tu

He said something to Pam to that effect. Pam gave a click of the tongue that is the equivalent of "Look out!" among the Piros Indians. They obeyed the warning.

Pam was toying with his rifle, the muzzle of which was pointing in their direction. Tu had an arrow on his bow-string and was looking vacantly over the heads of the Piros. The Piros understood.

The Carripunas had dropped their loads and were attending to Guila, who, moaning piteously, was still stretched on the ground.

"Tell these fellows," said Deering to Pam, pointing to the Carripunas, "that if they want to go back to their tribe they can do so. Nobody will stop them. If they like, I'll fix up the back of their master"

Pam repeated Deering's words. The savages looked incredulous, yet with a gleam of hope in their sunken eyes The Carripunas exchanged some sentences, dropped on their knees and crawled to Deering. One gripped the Texan's foot and placed it on his head. Then he gathered up a handful of earth and sprinkled it on his own cranium.

"That mean he your man till he turn to earth—go dead," explained Pam. "He do this for both."

The aborigines then turned their attention to their comrade, whose moans had now subsided into occasional sighs of pain.

Meantime Guila had staggered to his

feet, wiped some of the blood from his face, and gathered up his armament.

Deering turned on him.

"Now, you get!" he said, shaking a threatening forefinger. "If I ever catch you or your Piros within gunshot of our camp I'll make you jump—you *cabrone!*"

The Spaniard made no reply. He smeared his face some more, said some words to the Piros and to the Carripunas. The latter looked entreatingly at Deering.

"What did he say to these Indians?" said the Texan, addressing Pam.

"He say they come along with him right way or he make them think they in fire-ant nest," was the reply.

"Hold on, Harry, it's my turn, isn't it?" cried Osborn as Deering, with a flame in his eyes, was turning to the Spaniard.

"Go ahead!" was the curt reply.

The New Yorker advanced on Guila.

"You know as well as I do the laws of the Brazilian government regarding the ill-treatment of the Indians," said Osborn. "When we get back to Jutupica I'll bring this case before the attention of the proper authorities. You'll find that they won't dare to be bulldozed or bribed when the railroad people are behind the complaint.

"This is the last trading trip that you'll make to the Manuel River and the Rodo, if, indeed, you are a legitimate trader. I have my doubts, though. If we went through your baggage I think that we'd find a bunch of stuff that you aren't allowed to sell to the bucks. Now get!"

"Quite a neat layout you gave him," said Deering approvingly. "Where did you get acquainted with the laws?"

"Never heard of 'em," laughed Osborn. "I have a vague idea that there are such laws, but they are a dead-letter as far as their enforcement is concerned. Still, I think that if the South American Construction Company raised the question some of the decorated gentry at Jutupica would have to get a move on."

Deering had the whipped Carripuna brought to him. The poor fellow was in a shocking condition. Lines of flesh had been cut from his back by the wire lash.

There had been considerable loss of blood, and the pain of the wounds was aggravated by a crowd of bloodthirsty insects.

"A white man would be dead of exhaustion or blood poisoning in a day or so," said Deering to his companion. "But this fellow will pull through. I've seen some incredible recoveries among Indians in Mexico and Colombia. Now, we'll try and give the poor chap a little ease."

The Texan got out his first-aid outfit, washed and cleansed the wounds, dressed them with an antiseptic, and finished by covering them with gauze and muslin. The comrades of the patient watched intently, and occasionally exchanged exclamations of amazement and awe.

"There, old pard," said Deering at length, "you'll do. In a week's time you'll have nothing but the recollection and the welts. Tell him what I say, Pam."

"Now, ask them how it was that they were playing pack-burro for the Spaniard," went on Deering.

An ugly expression came to the faces of the trio of savages as the *moso* put the question to them. One of them, who acted as spokesman, rose to his feet and began a rapid jabbering; so rapid, indeed, that Pam had to check him at intervals, in order to get at the sense of the oration.

The others occasionally gave a grunt of encouragement and acquiescence. Ten minutes passed and still the words came. Pam held up his hand to the speaker to indicate that he had heard enough.

He turned to Deering and Osborn and gave them the gist of what the Indian had related. It was to the effect that the three Indians, at the beginning of the "Fall of the Rivers," which was equivalent to three months before, had engaged themselves to Guila as carriers for a single trip from the neighborhood of Jutupica to a point on the Rodo River, about a hundred and fifty miles from the town.

They were to be paid in supplies. At the end of the trip the Spaniard sprung the ancient peonage trick on them. He declared that they were in his debt, and that in order to discharge it they would

have to make a further journey with him. When they demurred he produced the whip, covered them with a pistol, and thrashed them brutally.

At this stage of the tale Pam turned to the orator and his companion and said something. The pair came forward and showed to the white men the ridges and cuts on their backs, made by the wire lash. Neither Deering nor Osborn had noticed these proofs of the barbarity of Guila.

From the time of the first whipping the poor fellows were treated most cruelly. Starved, beaten, and overworked, it was little wonder that they made more than one attempt to escape. In each instance, however, the Piros frustrated them.

These Indians seemed to stand close to Guila. They were well fed, never whipped, and carried bows and arrows. While the Carripunas were hobbled together at night to prevent them from getting away, the Piros were given full freedom.

"Ask them where the Piros weapons were when we met them?" said Deering.

A few words were exchanged between Pam and the Carripunas, and he turned to the white men.

"They say that Guila and all had been watching you all morning. They say Guila tell Piros put arrows and bows out of sight in packs."

"Then Tu was right?" queried the Texan.

"Tu right," assented the *mozo*.

"So," said Deering, addressing Osborn, "we were being spied on by this fellow, and he thought it well to deceive us and lie to us! The plot thickens."

"Nope. It seems to me that it is clearing!"

"Meaning?"

"The meaning will keep, Harry. Let us hear what more our copper-colored friends have to tell us."

Deering looked reflectively at his toe-tip when Pam asked if there were any other queries that he wanted put to the Carripunas.

"I'd like to find out what Guila was doing on the Rodo and if these men or the Piros were with him at all hours of the day and night," he said.

"You're on, Harry," said Osborn softly. "I don't think that I need refer to that 'meaning' of mine."

Pam talked earnestly to the Carripunas for quite a little time.

"They say that when get near Rodo the Piros tie them tight to tree, and that they once think that they going to be eaten by *ecitons* (ants). Army of ants pass few feet from where they be tied. They be tied up twice in past few days."

"Didn't their tribesmen ever try and rescue them?" asked Osborn. "With the cover that these jungles afford I should have thought that Guila and his Piros could be easily wiped out."

"Carripunas say Guila great witchman," went on Pam, the interpreter.

The superiority of Pam's tone as he summed up the aboriginal population of the Manuel jungles was convincing

A silence ensued that was broken by Deering telling Pam to ask the savages if their tribe was located far away.

"Tribe don't keep in one place," explained the *mozo*, after he had talked a little to the Carripunas. "But if they can reach river they think they be all right. The river Injins not much good in jungle. Guila give 'em nothing eat since yesterday, and they think he lay for 'em in jungle, too. They doubtful 'bout reaching river."

Deering's lips became two thin lines.

"How far do you reckon it is to the Manuel?" he asked.

"Should say ten eleven miles. Take three—four hours get there. Too close trees. Machete have to cut! cut! on underbrush all time."

"Well, we'll put these chaps through to the water, anyhow," said Deering. "If this beef-chip, Guila, tries to stop us, he won't mend the holes in his hide with a needle and thread. Pam, give these poor devils all the grub they want. After that we'll make a start. I guess that the fellows at Camp 29 will continue to live even if we are a few hours behind time."

CHAPTER XII.

Tu Climbs a Tree.

THE *mozo* translated the Texan's words to the savages. The joy on the faces of the poor wretches was

matched by the gratitude to Deering that they tried to express by signs, gestures, and sounds. Human nature is the same all the world over, whether the skin that encloses it be white or black or yellow. It responds to kindness, and gives in kind to the giver.

At this juncture the unlooked-for happened. The Texan suffered a relapse, and once more a *tlato* had to be built and the quinin bottle uncorked. As the patient was losing his senses he turned to Osborn.

"Tell Pam and Tu to build a hut for that unfortunate Carripuna. If the insects get at him they will undo all the good of the dressings," he whispered

Then Deering's senses sailed uneasily to a misshapen land where small red devils tried to pry off the top of his skull with tiny hot shovels.

Tu went off to hunt. Pam gave the visitors such food as was handy, and the promise of more later. Osborn watched by the side of his chum. The afternoon dragged slowly. The songs and chatter of birds, the hum and drone of insects, and the jabber of monkeys, all of which had been silenced by the midday heat, broke out afresh with the coming of evening.

The delirium of Deering abated somewhat, and he sank into an uneasy slumber. When he awoke he called for Osborn

"Wally," he said, when Osborn had crawled into the hut, "I can't stand toting these belts all the time. They're suffocating me; weighing me down. I shall founder in my tracks unless I'm relieved of them part of the day. Help me take them off!"

He was pulling weakly at his blouse Osborn knelt at his side and began to unfasten the outer garment. He knew that the fever aggravated the weight of the gold and that Deering's utterances were those of a mind rendered raw and irritable by the virus of the malady.

"Tell you what we'll do, Harry," went on Osborn, still busying himself with the buttons; "every day we'll get Pam to run up one of these shacks, into which we'll crawl, strip to the buff, and rest for a couple of hours." He was now busy with the buckles of the belts "We'll leave word that we aren't to be disturbed."

He removed the last of the belts Deering breathed a long sigh of relief, and his eyes began to close.

"Good idea," he replied drowsily. "You talk to Pam."

He dropped off to sleep again, and Osborn made his way softly to the outside, mopping his wet forehead.

"I can sympathize with Harry," he muttered to himself. "Lucky that both of us are not on the sick-list."

The time wore on and Tu failed to put in an appearance. Pam grew somewhat uneasy.

The Carripunas had eaten up all the food in camp, except some fruit and biscuits that had been reserved for the invalid. In the kits of Osborn and Deering were a few beef-capsules and some emergency rations; nothing more.

Pam did not fear starvation. At the worst the party could make for the line of the railroad; but he formed a pretty shrewd guess why Deering was avoiding the construction camps, and felt that he ought to keep away from them except in an emergency.

But in the interval food of a nourishing sort was needed A sufferer from jungle-fever, between attacks, is affected with an intense weakness that can best be relieved by a generous diet. Hence, Pam was anxious that Tu should show up with game. Not without cause had Mr. Mannering dwelt on the faithfulness of the *mozo*.

In the tropics the day disappears as suddenly as the dawn arrives. There is almost no twilight. At one moment the aisles of the forest are crimson with the last rays of the sun, and the next they are plunged into sudden darkness.

With these travelers the going of daylight seemed to be the cue for the coming of Tu, and he stepped from the gloom into the circle of light cast by the fire that Pam had built in anticipation of Tu's return with meat

With a grunt of salutation Tu threw on the ground the result of his hunt. This consisted of a small deer, of which there are several species found along the Amazon and its tributaries. There were also a brace of *pacas* (members of the rabbit family), and a *curassow*. Tu had been industrious and lucky.

"Thy hunt is as welcome to the eye as it will be to the mouth," said Pam,

addressing the Indian in the Mundurucus tongue. "Thou wert long gone, and we feared somewhat for thee. But lo! this tells why thy feet were slow to return to us." He pointed to the game.

"Not all the telling is there. I have been hunting men as well as food," replied Tu.

Pam looked at him in surprise.

"And did thy arrows find flesh?"

"Nay; but their words found my ears."

"Were the words good?"

Tu shook his head.

"Evil was spoken by the evil ones. The jararaca of the whip and the Piros, they it was who spoke them!"

The jararaca is one of the most venomous and hated snakes found along the Central Amazonian districts. To apply its name to a person is to inflict a deadly insult.

Pam passed the extended fingers of his left hand downward over his face, which is Mundurucus for intense surprise.

"My ears are open and my face is turned toward thee, Pamari-Tu. Tell me of the words that fell from their mouths!"

Tu went on to relate that soon after leaving camp for the hunt he struck the trail of Guila's party. Instead of making for the Manuel River, as the Spaniard had said that they intended to, they turned eastward and then doubled back to the west, until they were at the rear of the Deering camp. This excited Tu's suspicions, and he determined to stalk Guila's party.

At the end of several hours he came within sight and earshot of the trio. They were in the act of making a temporary halt at the foot of a huge cedro, one of the commonest and biggest trees of the Brazilian forests.

Here they proceeded to prepare a meal, and Guila bathed his battered face in a near-by pool.

Tu, with monkeylike agility, ascended the tree. Hidden by the thick foliage, he had no difficulty in getting so close to Guila and his men that he was unseen while hearing every word they spoke.

Guila used the Piros tongue with which Tu was quite familiar.

The Spaniard began by invoking the wrath of the gods of the Piros and others on the head of Deering. He told the savages of the tortures that he would inflict on the Texan when he got him in his power.

He promised them gum and cartridges and tobacco when, with their help, he was revenged.

The Mundurucus shrewdly surmised that the brace of listening bucks were chiefs. Guila wound up this part of his harangue by reminding the Piros that Deering and Osborn were to be delivered into his hands personally, when captured alive or dead.

Again Pam made the sign of utter astonishment.

Then the savages and their white companion discussed the Carripunas and their recapture.

The plan finally decided on was simple enough. Guila and his friends would watch out for the Carripunas while the latter were *en route* from Deering's camp to the river, and gobble them up at leisure.

"And I shall cut to little pieces the pig whom I whipped to-day! You shall see his flesh fly and smell his blood! If he were not so thin, I would offer him to be eaten by you!" were Guila's words.

Tu added that, judging by other things that were said, Guila and his coppery chums knew that the Carripunas were still with the Texan, and that they were going to make a night reconnaissance of the camp to see if there were indications of the coming departure of the river men.

"That is all I heard, Pama Manegele," concluded Tu. "Yet, stay! Know you of the Flat Rock of the Charapa on the Rodo?"

"The Rodo runs by a multitude of jungles and swamps and its rocks are many. I know not that of which you speakest. Why asketh thou?"

"The jararaca"—he spat on the ground—"tells the Piros that when he has the *señors* in his hands he will give them the promised guns at the Rock. Not in many places are the *charapa* (the great turtle) found. When the *señors* are at their destination and I am free to come and go again, I seek this rock. It may be that good will come of my finding!"

"Even so may it be."

In the mean time the Carripunas had skinned the deer, prepared the pacas, and plucked the curassow. Pam kept some of the choice parts of the first and all of the latter for Deering and Osborn. Then he motioned to the Carripunas to fall to on the balance, not, however, before he had reserved a liberal share for Tu and himself.

The manner in which the half-starved savages went for the grub told of their hunger. In half an hour nothing remained but bones.

A stew of the venison put new life into Deering. Osborn voted grilled curassow as good as the turkey of civilization.

"What was Tu throwing into you, Pam?" asked the New Yorker, as he helped the *mozo* pack away the aluminum plates and collapsible knives and forks

"You mean what?" queried the puzzled Pam.

CHAPTER XIII.

Deering's Invention.

THE Texan had so far recovered by midnight that Pam thought he was justified in relating what Tu had told. Deering listened intently, and a grim smile curled his mouth as the *mozo* came to that part of the tale in which Guila spoke of the fate that would befall him when he was captured.

"This shows that I'm more than warranted in seeing the Carripunas safe to the Manuel," said the Texan. "Otherwise it would be their capture or death. We will make an early morning start. Tell Señor Osborn to come to me."

Pam obeyed and then retired. Deering told his chum of the news that Pam had brought.

"Now, I propose to give this party a surprise," said the Texan, as Osborn paused to recover his breath. "Hand me my dufflebag."

Deering drew from the knapsack a little package.

"This is a contraption of my own," he explained. "When I had this job offered me, I got to thinking as to how I could prevent visitors dropping in on us here in the jungle sort of unexpected and sudden This, applied to men as well as beasts. The answer is simple. Here it is."

It was, indeed, a simple thing, consisting of a hank of fine copper wire, a couple of dry cells, and a pair of electric bells

"There's forty yards of wire," explained Deering. "We string it around the camp in two sections, each connected with a bell. One end of each section is grounded; the other isn't. Wire is set about ankle high. Along comes Señor Guila, or one of his highbinders. He touches the wire, closes the circuit, and the bell connected with it rings!"

"And then?" queried Osborn.

"And then," repeated Deering, "if I happen to be around or awake when the bell gets going, I let loose with the rifle. You can do as you please."

"It'll please me to pump lead also. You know it, you old steer!"

"Don't forget to shoot as if you were using a garden hose. Sweep the section. You won't hit, but you'll scare! And, Wally?"

"Yes."

"You attend to the wiring, will you? I've a feeling as if some mean person had stampeded the pit of my stomach. My nerves are twittering."

"Pam says that you'll be most yourself by morning; that the fever has about worn itself out. You'll be practically free from it for the rest of the trip. He's got a bottle of copabia oil ready to run into the pimples that will presently afflict you and through which the malarial demon will crawl out of your person."

"Sounds mighty cheerful. Now, if you'll handle the fixings I'll have another snooze."

Osborn, assisted by Pam and Tu, strung the wires in short order, the Carripunas watching in silence. The *mozo* explained to them that the copper threads were strong medicine to tell the white men if enemies were around.

Then the fire was toned up for the night, and Osborn took the first watch, Pam explaining that trouble would not materialize until the early morning, that being the time Indians invariably chose for an attack. He and Tu would come on duty at three o'clock, and call Osborn and Deering if necessary.

So the New Yorker, with the magazines of his automatic and rifle filled, took his station in the shadow of a huge tanimbuca-tree, wrapped his poncho around him, for the night was damp, and waited.

The vigil was not one that would recommend itself to a nervous man. From two near by points in the forest rival companies of howling monkeys (*quaribas*, the natives call them) were trying to yell each other down. There were eery sounds overhead and in the underbrush—rustlings, squeakings, and gibberings.

Bats of various sizes flew round Osborn in numbers. Vampires whose scarlet snouts and ruffled wings caught the reflection of the firelight, added to the uncanny vigil.

Once the New Yorker saw a pair of green and luminous eyes peering at him from the edge of a thicket. He threw his rifle to his shoulder, and even as he did so the apparition vanished. On two or three occasions snakes wriggled rapidly across the line of light.

From a swampy place not far away a multitude of the huge frogs of the Amazonian forests kept up a continuous bubble-hoo-drum-drum! Lizards scuttled around Osborn's feet. A scratching and squirming overhead revealed to him a huge iguana.

The sentry duty was by no means monotonous, for, in addition to all else, the mosquitoes and piums were both plentiful and hungry. Osborn envied the Carripunas, who, insensible to sounds and insect stings, were slumbering soundly a few feet from him.

At three o'clock Pam and Tu crawled out of the *tlato* that they had built for themselves, and were just getting on their feet when one of the alarm bells rang.

Osborn did not hesitate. Up came his rifle and it began to spurt fire. Pam's followed suit. Tu sent a few of his blow-pipe missiles into the darkness. Deering crawled out of his hut, rifle in hand.

"That's enough to scare 'em," drawled the Texan as the rattle of the rifles ceased. "No good wasting cartridges. I'm going back to bed. Wally, you go and pick up the dead and wounded."

Deering dragged himself into the hut. Malarial fevers make for languor.

Osborn snapped the switch of his electric torch, at which the savages sunk on their knees and covered their eyes with their hands. Followed by Pam and Tu, he made for the section of the wire that had rung the bell. Beginning with the "ground" they followed the wire through the brush. Half-way between the bell and the end of the section they found the cause of it all.

Lying with its head in a tuft of grass was a big capybara, an animal that looks like a monstrous guinea-pig. A bullet from one of the rifles had caught it in the left eye and it was stone dead.

Osborn threw back his head and let out a shout of laughter. Pam chuckled quietly, and even the stolid Tu twisted his features into the semblance of a smile. The Carripunas, in the background, looked on curiously. Pam turned to them.

"The wicked witch doctor of the Piros has turned himself into a ronsoco so as to spy on us; but the medicine of the white men was too strong for him. Come and behold his fate!" he cried.

Pam could always turn the majority of happenings to account.

Though amazement was pictured on the faces of the savages as they took in the situation, nevertheless they ate a portion of the witch doctor for breakfast a little later on, and with much relish at that.

CHAPTER XIV.

The Tale of the Burning Water.

THE journey to the Manuel River was accomplished without difficulty or detection on the part of the railroad working force. The party luckily struck the line at a point midway between two of the construction gangs, and so were not seen.

When near the river Pam suggested to the Carripunas that they go ahead so that in the event of their meeting with any of their tribesmen they might prepare them for the approach of the white men.

The savages obeyed and disappeared in the jungle growth that fringed the river, the others following slowly.

Half an hour passed and there were no signs of the return of the late guests of Deering. Osborn openly voiced his belief that the last had been seen of them. The others did not agree with him.

Another fifteen minutes sped by and still there was nothing doing. Osborn was in the act of repeating his convictions and Pam and Tu were discussing the situation, when there came from the forest ahead a cry that Pam instantly answered.

Then there came in view some thirty or forty Carripunas, headed by the wearer of the feather to whom Deering had given the boa.

Behind him were the missing trio and the two others who had shared in the snake. All bore in their hands grass or sprays of green leaves

"Here we are again!" cried the irrepressible Osborn, "all fed up and with new parrot feather millinery. Things are looking up with us!"

The chief and his followers seemed to have plumped up in a couple of days. The chief had decorated his head with the tail-feathers of a macaw.

The whole copper-colored crowd set up a shrill yell of welcome as they caught sight of the Deering party. The chief, whom, as Deering later learned, was named Piqui-trai, stepped forward and began addressing the Texan.

When he finished he did the foot-on-head salutation already performed by the savages rescued from Guila. He followed it by waving his arrows to all points of the compass.

Deering looked inquiringly at Pam.

"He say," explained the mozo, "that after he left you that day good luck come way of him and his tribe. You give him luck, he sure. You mighty good medicine. He kill much game; fish fill river where no fish before."

Practically all of the birds, beasts, and fishes of Brazil are gregarious. A district that is barren of game for many days may suddenly swarm with it in an unlooked-for fashion.

"Man you fixed up after whipping," went on Pam, "is his *vayapac huauqui* (uncle). Think him dead. Same now as if he come back from the great blackness. He asks good spirits all around to look after you."

"Tell him that I thank him and that the cigarettes are on me," Deering replied.

Pam obeyed and another jabbering ensued.

"What now?" asked the Texan, as the rapid-fire talking slackened somewhat.

He want to make you a chief of the tribe—a Carripuna blood-brother. Say it good for you if you travel much along the Manuel. No Carripuna hurt you. Give you grub if hungry. What I tell him?"

"Say that he can go as far as he likes, but I draw the line at man meat," was the reply.

"And ask him not to omit supplying the hair feathers," added Osborn.

Pam ignored the remark, and replied to Piqui-trai as directed by Deering.

The chief patted his chest to denote satisfaction, then turned to his followers and said something that made them yell joyously.

Plucking a long, needlelike thorn from a near-by bush he advanced to Deering. Extending his right arm, he plunged the point of the thorn into the flesh, and, motioning the Texan to bare his arm, did likewise.

Then he inverted the wound on his own arm so that the blood drops mingled with those of the Texan.

Next he dipped the thorn in the blood and waved it in the air to dry. Drawing a knife from a sheath attached to his arrow-quiver, he notched and nicked it queerly. He then handed the stick to Deering, saying something to Pam as he did.

"That show you real chief and show who made you one," explained the mozo. "Meet Carripuna, pull out thorn, and they do all you tell 'em. You now big bug in tribe. Piqui-trai he most powerful chief of Carripunas from here to beginning of Manuel."

Deering turned to Osborn.

"I sowed cigarettes on the Manuel and they came back to me in the shape of a boss job."

"All the same, you haven't got the feathers that go with it. I shall never feel that you are the real thing until you sport the bustle of a red-tailed parrot in your tresses."

The Texan handed around the cig-

arettes and made Piqui-trai a present of a five-dollar gold piece. He had nothing else appropriate to give him.

The chief examined the coin with much curiosity. He bit it and weighed it on his forefinger. He actually sniffed it. Then he turned to Pam and said something.

"He know it is gold," explained the mozo to the white man.

Piqui-trai said something else.

"He want know name in English. Shall I tell?"

Deering nodded assent.

"Gool! Gool! Gool!" repeated the savage after Pam. Then he added other words.

An expression of amazement shot over the face of the mozo. He talked to the chief earnestly and rapidly. Piqui-trai replied in kind. Pam turned to Deering, his black eyes sparkling with excitement.

"He say that some day he show the *señor* where much gold is. Little river, some long travel from here, have gold in sands. No tell anybody before; fear white men make his work finding gold. *Señor* only white man behave well to poor Carripunas. He say if *señor* have few cartridges to spare he sooner have 'em than gold. No can spend money."

"Isn't he the wise boy," ejaculated Osborn. "Goes fishing for cartridges with an alleged gold mine for bait Harry, as a chief of the tribe, I insist on your telling me from whence your blood-brothers got their contraband of war—their guns?"

"Ask the chief, Pam," commanded Deering.

Piqui-trai hesitated ere replying. Pam pressed him for an answer. Finally he told.

Just before the opening of the preceding wet season—the previous September—Guila had come to him and asked for half a dozen of his tribe as carriers. Guila explained that he was going on a prolonged trading expedition and that his bundles were numerous in consequence.

In return for the services of the Indians he would give Piqui-trai three rifles and plenty of cartridges.

The bargain was struck. The carriers were chosen by the Spaniard, and the guns duly handed over to the chief, not, however, before he had made Guila fire them to prove that they were in good working order.

Thanks to the rifles and the prestige they carried, Piqui-trai overcame the Misilions, a hostile tribe that lived on the west bank of the Manuel. Piqui had plenty of meat while the cartridges lasted; but the last one having been fired, the rifles were cached and the tribe had to fall back on its primitive weapons for support.

Of the six Carripunas who had gone with Guila, nothing more was heard. Once a rumor reached Piqui-trai that the Spaniard had traded them to the Piros as slaves for jaguar skins and gums.

But when Guila paid his last visit to the tribe to secure the chief's uncle and the two other unfortunates, he swore by all the gods of the Carripunas that at the end of the trading trip he had paid them off, given them many cartridges, and had sent them home.

Having a glib tongue, Guila finally succeeded in persuading the simple savages that he was telling the truth.

"I know now that he was lying; that his mouth is as the mouth of a snake—stinging when it opens! The brothers of the men he destroyed shall yet treat him like a snake—even the urrito machacui!"

He referred to the playful habit of some of the Amazonian tribes of impaling that poisonous serpent on thorns and roasting it alive.

Pam translated the utterances of the Carripuna to the white men. They knew that Piqui-trai was quite in earnest and that a feast was also likely to follow the grilling of the Spaniard if the savages ever caught him.

Deering changed the unpleasant subject by telling Pam to ask the chief why the expedition to the gold-bearing river had to be deferred, and how it would be possible for him to get in touch again with the Carripunas to arrange a trip.

A long talk followed between Pam and the Indian, the gist of which was that the section of the tribe over which Piqui-trai had authority had an engagement with two other sections to hunt turtles and their eggs on the Rodo at a point where they were to be found in profusion for two or three weeks in

the year only. The savages couldn't afford to miss the sport.

Pam explained this to Deering, adding that the turtles, the Tortaruga *grande* as he called them, furnished soup from their giblets, sausage from their stomachs, steaks from their breasts, and a delicious roast in the shell from the balance. No wonder that Piqui-trai and his followers didn't want to be absent.

The Carripuna added that "one paddle"—this being the equivalent to about ten miles—up the river there was a little island on which grew six assai palms. After the turtle campaign was over, Piqui-trai and his men would be in the neighborhood of this island, harpooning the great pirarucu (red fish), and would remain there for some weeks.

They would be on the lookout for Deering if he wanted to meet them again.

After a chat with Osborn, Deering signified his intention of being on hand. The chief grunted contentedly. Then he looked inquiringly at Deering.

"Sure," said Deering. "Pam, get fifty cartridges and give them to our *amigo*. A gold prospect is cheap at that price."

The Carripuna chuckled joyfully as he fingered the shells and stowed them away in some miraculous fashion in his breech-clout.

"Ask him how he knows that they will fit his guns," said Osborn to Pam.

"He say that easy. He carry size of gun-breech in his eye," replied the *moso*, after putting the question to the savage.

Osborn looked at Deering.

"They certainly have it on us in some ways, Harry," he said. "I can't tell what size gloves a girl wears unless I ask her."

Piqui-trai handed Deering the five-dollar gold-piece, accompanied by some words addressed to the *moso*.

Pam shrugged his shoulders and turned to the Texan.

"He say he don't want money. No can spend. Gold money bad, too."

"Ask him why," said Deering suddenly.

Pam put the query. The chief turned to his uncle, the whipped man, who, at a sign from the former, began to speak rapidly.

When the Carripuna stopped Pam turned an amazed face to Deering and informed him thusly:

The uncle's name was Papto-tinga, meaning the toucan. About seven weeks before, and while he and his companions were captive to Guila, they were one day tied to trees in the usual fashion, while the Spaniard and the Piros took themselves off.

When they returned late in the afternoon Guila blindfolded the Carripunas with the broad banana-leaves. Papto-tinga, by wriggling his eyebrows, managed to work up his leaf until he could see what was going on.

He saw the Spaniard emptying little bags of the accursed round pieces of gold into a larger bag. There was blood on the little bags. Guila laughed while he worked in a way that was not good to see.

When he finished he made the big bag into a bundle, poured "water" on it, and set the "water" on fire.

Then the Piros fell on their faces, for they were frightened by the curse that Guila had put on him who sought to steal the gold, and by the "water" that burned as fire.

"Then did the man put his hand in the blazing water and it clung to his fingers, hurting him not," went on the Indian. "And he said words, and the Piros cried out again. I knew not the meaning of the words, as I speak not the Piros tongue. Nevertheless, my heart was turned to water, and I cursed the banana-leaf for not staying in place when I worked my eyebrow."

"Where went you then?" asked Pam.

"After that we made our way along the Rodo for many days. Once more we were tied to trees and the ants came close to us. When we turned our faces westward again, the Piros bore no burdens with them. The gold and the other bundles were not on their heads."

"Guila must carry a regular conjuring outfit with him," began Osborn. "One time Seidlitz powders and now alcohol."

"This is no time for fooling!" exclaimed Deering. "What this savage has told us gives the clue to the mur-

derer of Payson and his *moso,* and, very likely, the murderer of Payson's predecessor!"

CHAPTER XV.

Escaping the Storm.

OSBORN'S jaw dropped with sheer amazement. Words failed him.

"Our duty and plan of action are alike clear enough," went on Deering. "We must get to Camp 29 as soon as possible; give up the yellow goods, and then notify Mr. Mannering that we're off on a still hunt for Guila. When I say 'we,' I'm presuming that you'll go along?"

"You're not presuming in the slightest, Harry," replied Osborn. "I'd be most unhappy if I didn't go picnicing with you in this matter—and you know it."

Deering nodded absently. He was already outlining a plan of campaign against the Spaniard. A little later, after having bid farewell to the Carrapunas, they resumed their journey, Pam leading and Tu acting as rear guard.

Extra vigilance was exercised by all in the party, now that the desperate nature of Guila and his allies was established. However, nothing occurred to disturb the travelers except the swarms of insects that seemed to increase with the progress of the party.

"This because we get near big swamp," explained Pam. "Must go round swamp seven miles to get in forest on other side of him. Too deep walk through. Many snakes there—big anacondas, forty feet long; *jacare-uassu* (a fierce species of alligator); leech in million."

"It certainly doesn't appeal to me as a stamping ground," remarked Osborn cheerfully. "What say you, Harry?"

Deering came out of a brown study and replied that he hadn't listened very closely to what Pam was talking about.

"Well, it doesn't matter much, anyway. You'll see presently that which your ears have missed."

Half an hour passed and then the forest suddenly broke away. For nearly the first time since the beginning of their journey they saw the sky overhead. In front of them was the swamp, its grays, dull greens, and browns relieved at intervals by splashes of lush verdancy and clumps of glowing flowers.

Although the afternoon was still young, a miasmistic mist was beginning to form on its surface, and a faint, sickly odor of rotting vegetation was apparent. The edge of the swamp seemed to be in motion. Deering pointed to the phenomenon as he looked inquiringly at Pam.

"Swamplice," replied the *moso.* "No bite, but tickle."

He gingerly stuck the end of a twig into the mass of tiny crustaceans and gave the white man a chance to examine the ugly little creatures at close range.

"They look like scorpions," said Osborn.

Pam shook his head.

"No real scorpions. Plenty round swamp. Centipedes, too. We have look out to-night when make *tlato.*"

The route round the swamp lay to the north in the first instance. Deering noticed that the *moso* and Tu continually looked at the sky. Yet the firmament was of a velvety blue, and not a speck of vapor sullied its serenity.

To the extreme north and on the swamp-edge lay a cluster of naked rocks, a not unusual feature of Brazilian morass. They were gray and of pyramidal form. Their bases clustered together in an irregular fashion.

Pam pointed them out to Deering.

"We must hurry get there!" he said. "Storm soon come; blow down trees, blow us in swamp. Rock fine for us shelter. Better than jungle."

"A storm at this time of the year, Pam? Are you sure about this? Why, the wet season is two months away and there's nothing in the sky to get us on the run."

Deering, who spoke, stopped suddenly. In the northeast there was gathering a filmy, dusky vapor that was robbing the sky of its life and beauty without altogether depriving it of its sapphire tint.

"Hurry, *señors,*" cried the *moso.* "This a *sinzoro!* We just time get to rocks."

The Texan needed no further urging

He knew what Pam meant. The Indians of the Amazon say that a *sinzoro* is the god of the wet season, paying an advance visit to the earth, so that he may be assured that all is prepared for his coming.

But his tours of investigation are invariably of a cyclonic order, and do infinitely more damage than the tempests of the wet season proper.

But the white men, handicapped by the weight of the money-belts, moved too slowly for Pam and Tu.

The film of the sky thickened and became sooty. Far away a faint moaning could be heard. Flocks of parrots and other birds flew screaming from the jungle and back again. Animals feeding in the swamp rushed for the shelter of the thickets. From the swamp itself came strange bellowings, gruntings, and crashings

Pam looked at the Mundurucus and nodded. Tu placed his right arm beneath the left of Osborn and broke into a sharp run. Pam did likewise with Deering.

The race between men and storm was a close one, but the men won by scant seconds. As a pall of utter blackness blotted out the forest and swamp, they crawled into the shelter of a cave formed by the triangulation of a trio of the rock masses.

Here they awaited the *sinzoro*.

Osborn flashed his electric torch on their surroundings. The cave was about ten feet in height, of irregular shape, and twelve feet across at its broadest point.

The entrance might have measured four feet across. The floor was rock, covered with a layer of dust, at which Pam grunted his approval.

He knew that, with the swamp near, neither reptile nor insect would be likely to choose the cave as a dwelling or loafing place.

The far-off moaning drew near. The darkness seemed like black velvet. The air became suffocatingly hot

Osborn, lying prone, gasped for breath painfully. Deering, accustomed to arid experiences in his native State, bore the infliction silently. The half-breed and the Indian gave no signs of suffering

Nearer and nearer grew the moaning, increasing in volume and power and terror as it came. There was a sudden pause as if the *sinzoro* was gathering its strength for a final swoop. A roar and crash followed as if the heavens had dashed themselves to fragments on the rocks.

Luckily the cave entrance was to the leeward, and the force of the storm spent itself on the rear of the rocks.

For some seconds the overwhelming sound of the tempest seemed to crush the senses of the men. Then, as the roar and howling died away they recovered themselves and sat up, for they had instinctively taken a prone position when the storm burst.

On the tail of the wind raced thunder and lightning. There was no let-up to either. Nature had given the "fire at will" signal to her celestial artillery. Once the tallest rock of the group that formed the cave shivered and cracked.

By degrees the tumult lessened, the rain became less torrential, and a smell of freshened and grateful vegetation filled the air. The curtains of blackness that the storm had drawn across the sky thinned rapidly and finally disappeared.

As the sun came out again, Deering noticed that its light penetrated the rear of the cave. More to stretch his legs than anything else he walked over to the crevice and examined it. Much to his surprise the fissure in the rock seemed to be of recent date, for its surfaces were clean and sparkling.

He put out his hand and felt the cleavage. As he touched it a large fragment fell away, and still another, until there was quite a large hole in the boulder. All the broken pieces showed signs of fresh detachment.

Deering was puzzled until the remembrance of the lightning-stroke came to him. Then the whole matter became clear enough. The stream of electric fluid had shattered the rock without materially displacing the fragments where it had hit.

Calling the others to him he showed them his find.

"When shall we be able to get going again, Pam?" asked Deering.

The *moso* looked at the sky and the swamp before replying

"Four hour. Much rain fall. Can't

walk round swamp until earth suck some up. Much snake, too, come up round swamp this time."

"Cheerful outlook, that, Wally. We aren't making good time on this trip. Everything seems to be against us."

"It's better than being cooped up in a muggy office," declared Osborn. "Harry, you don't know the woes of drawing plans in the tropics, with nothing to break the monotony but the quinin bottle and an occasional invasion of ants."

"No, I don't—and I don't want to. And, it's about time for Pam to hand out the feed, isn't it?"

The *moso* looked outside. A flat slab or rock that was already dried by the sun would make an inviting dining-table. He went forward to investigate.

As he did so there came a flash from the near-by jungle to the north. A bullet flattened itself against the rock a few inches above his head.

CHAPTER XVI.

From the Cave.

PAM did what most men would do under the circumstances. He ducked in the first place, and he bolted for the shelter of the cave in the second. The others had heard the crack of the rifle and the thud of the missle, and needed no explanation as to his hurried entrance.

"Well, of all the—" began Deering, as he snatched up his rifle. But he got no further.

The rifle in the jungle cracked again. With a whining slap the bullet embedded itself in the south side of the cave.

It was followed by others in rapid succession. The Texan abandoned his intention of making an investigation from the outside.

Luckily all but Tu were on the north side of the cave. One of the nickel-plated souvenirs grazed the tip of his ear, causing it to bleed profusely.

The Mundurucus dipped his forefinger in the blood, flicked it lightly in the air, and chanted something that seemed to be full of menace.

"What is he saying?" Deering asked Pam.

"He make the blood for-blood oath of his people. I sooner have a *sucurnju* after me than Tu, now that he take oath!"

The *sucurnju*, according to the natives, is a sort of a fabulous anaconda that never ceases to follow the trail of a human being that it has marked as a victim until it has encircled him in its coils.

The rain of bullets was now stayed. After a time Pam drew the cleaning rod of his rifle and, placing his sombrero on the end of the barrel, cautiously advanced it outside the cave-opening and close to the ground.

At once the fusillade broke out again. It was evident that the attacking party was on watch. The headgear was withdrawn. In its crown was a neatly punctured hole; ditto in the brim.

"Lucky my head not there," laughed Pam. "What you doing, *señor?*"

The query was addressed to Deering, who was tugging away at the fragments left by the lightning stroke.

"Getting tired of being held up by a one-gun man. I'm going to give him a flanking taste of this medicine."

He tapped his rifle.

"May I come along, Harry?" asked Osborn.

"You stop and help guard the front of the cave. Hullo! what's the meaning of this?"

As he spoke the fire of rifles broke out in the jungle. A shower of missles whined and splashed on the rocks. Deering noticed that only one or two entered the cave. Evidently reenforcements had arrived.

"Sit tight, Wally," he cried. "These fellows may try a rush after the next volley or so. I'll give them a touch of the unexpected, though."

He managed to crawl into the open with some difficulty. Here he found that the thunderbolt hadn't confined its attention to one rock only. It had struck three others, sprinkling the ground with huge fragments.

The Texan smiled grimly as he noted the capital cover that the fragments afforded.

"The gods are on our side," he quoted, and there came to him a memory of the peaceful surroundings, amid

which he had learned the words and a grimly humorous appreciation of his present environments.

Making his way to the westward with infinite caution, the Texan at length reached a place where two of the fragments jutted crosswise, so as to afford a good outlook and a rest for his rifle. The slight exertion he had just undergone caused his hands and arms to tremble violently. The aftermath of the fever was still with him.

As he slowly raised his head above his cover the firing broke out again. The spurts of flame made a capital target. Resting his weapon in a rocky embrasure, he took careful aim and pulled the trigger again and again until the magazine was empty.

Shrieks and shouts and a commotion in the jungle growth told that some of his bullets had not gone amiss. At the same instant Osborn and Pam opened fire from the front of the cave. The sound of retreating footsteps in the forest was distinctly audible. Tu said something to Pam.

The *mozo* passed it on to the white men thus:

"He say that they be bad hurt or bad scared, or wouldn't make so much noise going away. Injin most times go quiet as jaguars!"

"How does he know they were Indians?"

Tu replied without hesitation, when Pam put it to him.

"He say that Injins shoot high always. Near all bullets hit rocks high up. Piros use gun. Him think no good try kill you with bow and arrow."

"And they can't get away with me at that." Deering laughed.

Pam looked curiously and meditatively at the Texan. The latter caught the look.

"Well?" he said good humoredly, "out with it, Pam."

"Tu also say you be powerful favorite with gods when they make hole for you to slip out—give devil to enemy! Tu say when he get back to tribe he tell all 'bout you. Then they make you chief, like Carripunas."

"Can we venture on our way in an hour or so?" Deering asked Pam.

The *mozo* nodded.

"Think so. We throw bad scare into Injins and" he halted abruptly and looked at the Texan.

"And, Guila," added Deering, "I've not the slightest doubt that he it is whom we have to thank for this lead-sprinkling."

CHAPTER XVII.

Tu Scents More Danger.

TU, by a circuitous route, slipped into the jungle, partly to hunt and partly to scout.

Pam went off to investigate conditions around and beyond the swamp. Deering and Osborn chatted and smoked and discussed the trip and the outlook for the future.

"Not that I'm counting on striking it rich," explained the Texan, "but you know I once told you that I never knew an Indian yet who went back on a man who had done him a good turn. This Carripuna chief may or may not be right about the dust-bearing sand, but I'm sure that he thinks he is."

"Well, this trip hasn't been barren of incident, so far," said Osborn. "If we only had a moving-picture camera with us, what films we could make"

Pam soon returned and reported that the trail around the swamp was impassable and would remain so until the following morning. Therefore, a stay for the night would have to be made in the cave or some other place near-by until the morrow.

"What do you think, Pam?" asked Deering.

The *mozo* narrowed his eyes as he was in the habit of doing when pondering a matter.

"We wait see what Tu have to say," he replied at length. "If Tu tell Injins all gone, this good place to sleep. If not gone, easy get and go some place else."

"Then I prayerfully hope that Tu will put the 'O.K.' on this habitation," sighed Osborn. "I'm yearning to snooze under a roof once more, and this marble mansion has some semblance of the real thing."

Tu soon showed up, bearing a mess of pacas and an armadillo.

He stated that there were many blood-marks in the jungle from whence

the rifle fire came, and that there were evidences of panic along the line of the retreat of the assailants

One of these took the form of a package of cartridges which he had picked up. Considering the value of these to the Indians, it was plain that their fright was of an extreme nature or they would never have abandoned the cartridges.

"Ask Tu what it was that threw such a scare into 'em," said Deering. "Surely it wasn't merely because we opened fire on 'em."

The *mozo* and the Indian talked at some length. There was a suggestion of suppressed laughter on Pam's face as he turned to the Texan and related what Tu had told him—that the Piros probably knew the rock formation, including the cave, quite well, and knew, too, that there was no exit from it at the rear. They had watched the party enter the cave and proceeded to act as their leader ordered.

When, however, Deering opened fire from *behind* the rocks they were stricken with superstitious panic.

It must have seemed to them that the man with the invulnerable body had gone right through the rock in order to get his rifle to bear on them.

They bolted forthwith. It would probably be some time before they could be again persuaded to tackle the medicine of the white man

"Harry, if this kind of thing goes much further, I shall begin to believe in your supernatural powers," said Osborn solemnly. "When everything conspires to upbuild your reputation in this respect, it's about time that I became a convert."

"Pam build fire; cook in rocks at back," said the *mozo*. "Tu help get ready pacas and armadillo. We no take chance to make dinner in front of rocks."

"Cautious chap, isn't he?" said Osborn. "Won't take chances of stray Piros spoiling the grub. Now, Harry, we can get rid of these infernal belts for a time."

The belts removed, the men enjoyed a savory dinner, for pacas and armadillo are probably the most tempting of the animal foods of the Brazilian forest.

Tu also brought in some attas. The atta is one of the most luscious fruits found in the Amazonian valleys. The rind is frosted with sugar and encloses a rich, custardlike pulp of an indescribably delicious flavor.

"This sort of food reconciles me to piums and Piros and other plagues hereabouts," said Osborn, as he swallowed the last of his share of the attas.

"It's a good thing to be reconciled to that which you can't escape," drawled Deering.

"Including a fractious partner from Texas," retorted the New Yorker

Deering smiled indulgently. He was only a year older than Osborn, yet sometimes he assumed a protective, fatherly air which Osborn laughingly resented

"It isn't that you haven't pony sense, but you've lived so long in cities that it's some wilted," the Texan said to Osborn. "People who look at life through windows sometimes mix up the specks on the panes with the real things on the outside. You've got to be in the open to know men and methods."

The night passed peacefully. With the first flush of dawn, Pam set the coffee-pot on the embers of the fire.

"After swamp is passed, one more sleep and we strike Camp 29," said Pam to Deering, as he served breakfast

"What have you ahead of you when you get through with this job, Pam?"

"No job. Pick up something, mebbe, at Camp 29. If not, make way down river to Jutupica. Know many canoe Injins on Manuel."

"If all goes well, perhaps I'll have work for you and Tu. Will you come with me?"

The black eyes of the *mozo* sparkled with delight. He made the Indian sign of happy acquiescence—the extended fingers of the right hand held over the head.

"Tu glad to come. You a warrior, he say. Great medicine man, too."

The ground showed no traces of the storm of the preceding day, except where the rain, rushing down rock-spaces, furrowed its way through the alluvial deposit that bordered the swamp.

But insect pests were out in uncounted legions, and things that crawled and

wriggled were also much in evidence on the trail.

The white men blessed the inventor of mosquito veils and anathematized the makers of the "fly dope" they had brought along with them and which they had thickly smeared on their hands.

It was in vain that they did so, however. The stinging, biting insects seemed to be attracted instead of repulsed by the stuff. That night when camp was made the hands of both Deering and Osborn were black with the bites of the plums.

At length the swamp was passed, and the party took to the forest once more. The change was a grateful one, for by midday the sun was like unto a white-hot circle fixed in a red-hot sky. A lunch of fruit, the usual lay-off for the hot hours, and at about four o'clock the march eastward was resumed

After an hour or so of steady going, Deering noticed that Tu was snuffing the air and listening intently to jungle noises. To the white men these consisted entirely of out-of-sight screams and cries, and the chatter of parrots, toucans, and monkeys.

It was evident that the acute senses of the forest Indian could detect something that was foreign to these sounds.

Deering put the question to the *mozo*, who in turn passed it on to Tu.

"Tu say that he think he smell Piro —not quite sure. Tell soon."

Osborn chuckled. "That's a new one, Harry," he said. "You don't use calling cards in these jungles, you leave an odor when you go visiting!"

"Don't laugh at what you don't understand, Wally," rebuked the Texan "I've heard of this thing before. If a dog or other animal can smell man or game a long way off, there's no reason why the natural nose of an Indian shouldn't do likewise."

Another half-hour passed and the nostrils of Tu continued to quiver sensitively. It was obvious that the telltale odor was still in the air, but the Indian seemed unable to locate its direction or distance.

Deering watched him with much interest. The Mundurucus seemed to be a survival of the ages when the smelling sense of the human was as keen as that of animals.

"How is it Tu couldn't sniff out the Piros before to-day?" the Texan asked Pam.

"Only after rain, scent good. Much dry and sun, no can smell," was the reply.

"Then you've known Indians smell out other Indians before?"

"Heap times. Tu got sharp nose."

Just as the *mozo* had finished talking, Tu came to a sudden halt, motioning the others to do likewise. Like a bronze statue he stood for some seconds, his head upraised, his nostrils dilated, his eyes narrowed with concentration. Then he spoke a few rapid words to Pam and disappeared into the forest.

"He smell Piros close by," explained the *mozo*. "Go to find out. We walk slow. He come later."

CHAPTER XVIII.

Another Night Visitor.

"CAN'T the Piros return the sniffing out compliment?" asked Osborn. "Can the Piros smell as well as Tu?"

The *mozo* gave one of his characteristic shoulder shrugs.

"Don't think so. Not every Injin same as Tu. Piros poor lot!"

At the end of another half an hour Pam gave the signal for the evening halt.

Even as he did so, the Mundurucus glided out of the jungle, bearing in his hand six wood doves and a "turkey" Tu never forgot his duty as larder administrator when on a scout.

As he threw down the game and slipped off the belt of alligator skin that supported the arrow-quiver, he began talking to Pam with much earnestness. Presently the *mozo* turned to Deering.

"Some Piros near-by. Not Guila, though. Tu trail Injins some ways. They gone off west. Tu no make out what they up to."

"No news is good news," quoth the Texan. "I allow that the look of that bird"—he pointed to the curassow "is rounding up my gastric juices. If you and Tu will turn *tlato* builders I'll undertake to cook the turkey."

Pam grunted his assent and the Texan proceeded to prepare the bird. Osborn tackled the doves.

The *tlatos* were soon finished, and when the architects turned from their labors they found that the Texan had built a fire and spitted the game, which was hissing and sputtering cheerfully.

"You no fool; you man," said Pam.

"Thanks," replied Deering. "But don't forget that Señor Osborn has been helping."

"He pretty good that all," Pam's tone was of qualified approval only. "Not like you, though."

One of the charms of the more or less primitive man is his frankness. If you want to know yourself as others see you, take a trip to a Brazilian jungle, in company with a *mozo* who hasn't learned to lie pleasantly.

After dinner that night Pam made a smudge of sweet-scented woods that he gathered in the near-by jungle, in the grateful antimosquito smoke of which he and the others sat at comparative ease

The talk turned on the Piros and the other tribes of Amazonian tributaries, and Tu, laying aside his wonted reticence, discoursed through Pam about the Indians he had met.

He spoke of the Uginas—a dwarf race with tails a foot and a half in length. Of the Tunantins who kill their first-born, and the Catanishes who perforate the lower lip in many places and stick twigs in the holes.

He related tales of the Purupurus who go naked, have but one wife, and bury their dead in the river beaches. He told weird stories of the Ucayali tribes who use their wives as slaves, kill all deformed children, and have no gods.

These tribes use two-edged battle-axes of hard wood and arrows five or six feet long, made from the flower-stalk of the arrow-grass.

Another dwarf tribe is called the Rimos, and its members are confirmed clay-eaters, so Tu asserted.

He spoke confidently of a white tribe called the Yameos that are fierce, warlike, and cannibals. Cannibalism, according to the Mundurucus, is fairly common among the tribes within a hundred miles or so of the Manuel River. The Miranhas, the Majeronas, the Conibos, the Campas, and other tribes turn their dead enemies into feasts.

It was well into the night when Tu ceased his narratives, the majority of which held the white men spellbound by reason of their unlikeness to the average story of the savage. Pam, at the suggestion of Deering, asked the Mundurucus why or how it was that he had come in contact with so many tribes

"Tell the white chief that from my childhood," said Tu, "I could not stay in one *tlato* for many sunsets together New jungles and strange faces were food to me. My feet tired with resting —not with walking. I heard voices calling from the trees. Always I craved for what was hidden by the trees. I listened to the calling and I went forth. Many and strange things have I seen because of my going."

"Clear case of *wanderlust*, Wally," commented the Texan. "Tu is a jungle hobo by his own confession."

Their flimsy huts were built close to a huge massaranduba, or "cow tree" so called because of the juice it yields when its bark is punctured. The "milk" is of the consistency of cream, of an agreeable flavor and can be used for coffee, custards, and other dishes. Pam promised some of the "cream" for breakfast

Near-by the *mozo* also located a growth of long-bladed grass which, on being crushed, gave forth a spicy, pungent odor. He assured the white men that if it were sprinkled on the roof of the *tlato* it would effectually keep away piums, mosquitoes, or any other kind of insect or reptile. He proceeded to thatch their shelter with it.

It was as Pam had said. For the first time during the trip Deering and Osborn heard not the "pinging" of the mosquito or felt the hot needle of the pium. It was with infinite relief that they stripped off the money belts and stretched themselves on the floor, with their knapsacks acting as pillows.

Osborn slipped into the land of slumber almost as soon as he was in a recumbent position. With Deering it was otherwise. Though his eyelids were heavy with slumber, he could not sleep.

He tried position after position, counted up to a thousand and beyond, imagined the flock of sheep going one at a time through a hole in a fence, and used other formulæ for inducing the downy god to settle on his brow.

With a sigh of despair and resignation the Texan gave up the job and began to listen to the night voices of the forest. Only one or two did he recognize—the yelling screech of the jaguar and the ear-splitting howl of the guaribas.

The rest were uncanny sounds given forth by creatures that hide in the trees by day and prowl only at night, and so are rarely met by man.

Deering pressed the spring of his repeater. The tiny bell chimed twice.

"This won't do," thought the Texan. "I won't be fit for a mile hike in the morning unless I get some sleep."

He turned over on his side and tried to shut out of his consciousness the sense and sounds of his surroundings.

As he did so he heard a faint sound on the roof.

A pause, and the noise was repeated.

Deering's hands stole down to where lay his electric torch.

The rustling continued. A stem of one of the palm leaves that was used for the thatching snapped softly.

Another pause and there was a faint hiss and a louder rustle

At the same instant there came to him a feeling of imminent peril

He hesitated no longer. Touching the switch of the torch he threw its beams and his pistol upward.

Suspended from a slender pole was a squirming coral snake—one of the deadliest, if not indeed the deadliest, of all the venomous snakes found along the Amazon.

Even as he looked the pole slid slowly downward, inch by inch, bearing the scarlet death with it.

CHAPTER XIX.

Under the Gloom Tree.

IN great emergencies the mind of a brave man acts with rapidity and accuracy. It does the right thing with promptitude. Deering instantly realized that if he fired, those who were responsible for the presence of the snake would make themselves scarce, dropping the reptile on him as they did so.

If he missed the chances were that he would be bitten, for the coral is looking for trouble most of the time.

In another second the creature would be upon him.

He did the wisest thing possible under the circumstances. Rolling over sideways and still retaining his grasp on gun and torch, he deftly got on one knee, bent the electric beam on the snake, took careful aim, and pulled the trigger.

The shattered body of the coral flew against the side of the *tlato*. There was a sudden scrambling among the branches of the cow-tree.

Osborn leaped to his feet with sleepy shout, ripping off the roof of the hut, and Pam and Tu came running up to learn the cause of the shot.

The body of the snake, the remnants of the vine that had been used to fasten it to the pole, and the pole itself a long swamp cane told the story

Pam cursed himself heartily for not foreseeing the danger of building the *tlato* under a tree. Tu related that the use of the coral snake was an old trick of some of the Indian tribes.

"How was it that Tu didn't get on to the ingenious guys with the snake rod by scent?" asked Osborn of the *mozo*.

Pam turned a bewildered and inquiring look on Deering. The latter explained the meaning of the question.

"Rain all gone from earth and leaves. So scent gone, too. Tu no can smell in dry weather"

"They sure are in earnest in trying to get us," commented the Texan. "It is inconvenient to be worth one's weight in gold, specially when the fact becomes known to Brazilian brigands. After we have delivered the freight we'll call for a new deck. I'm going to sleep, Wally."

Pam and Tu kept close but unnecessary guard. There were no more unfriendly visitors around during the balance of the night.

The morning found Osborn with chills chasing up and down his spine. A "steel band seemed welded round his head," so he said. His hands hot and clammy and his eyeballs of a topaz tint.

Pam expressed his vexation in plain terms.

"If we lay up for him," he said, pointing to Osborn, "we have make camp in jungle to-night. No want do that. That give chance to bad men to get you. They likely make good try to

do so. Last chance, you savvy, *señor*, I know 'em."

"Don't you worry," weakly called the sleepy New Yorker who had overheard the remarks of the *mozo*. "I'll stay right along with you. A light breakfast of quinin and coffee will fix me up to hike along woodland ways with the best of you."

The *mozo* grunted doubtfully. "He got what you call nerve," he said, "but he act more good than he talk."

"I think that way myself," answered the Texan, as he stole a quizzical glance at his chum.

The fever proved stronger than Osborn's optimism. After an hour of slow marching he dropped in his tracks, babbling incoherently. Tu and Deering picked him up and carried him to a grassy stretch.

The Texan fanned the patient, while the others hastily built a hut of the usual kind. When this was finished Osborn was placed inside, Deering undressing him and removing the belts.

When the Texan came into the open air again he found Pam waiting for him. The *mozo* seemed worried. Deering looked at him with a question in his eye

"The sick *señor* not fit walk till afternoon," said Pam. "This mean that we make camp again to-night. Don't like. Too many bad Injins here."

"Well, we'll have to do the best we can under the circumstances. I'm counting on luck staying with us. Besides, don't forget that the gods are on our side"

He smiled as he said this

Some of the depression in Pam's face departed

"I forgot. No reason why gods go back on us now, eh?"

"They haven't the slightest excuse for so doing, that I can see," said Deering with gravity.

Pam looked further relieved.

"I do not think much of Injin gods," he admitted, "but Tu he talk—talk all time 'bout you being choice, one-up amigo with 'em."

It was about four o'clock in the afternoon before the attack of fever had subsided sufficiently for Osborn to resume the hike. A half hour of going proved enough for him, however, and with a stagger and a gasp he made for a tree-trunk, against which he leaned helplessly.

The Texan caught him in his arms as he was in the act of slipping to the ground, laid him on the undergrowth and began to fan him with his broad-brimmed Panama.

"No use. Can't go further to-day. Must make camp for night. *Diablo!*" muttered the *mozo* aggrievedly, as he looked around him. "No like this place for camp."

"What's the trouble with it?" asked Deering.

Pam lowered his voice so that his words should not reach the ears of the sick man.

"Here—close by, Señor Payson and his *mozo* killed. I one of men who find bodies. Bring 'em to Camp 29."

"You were? I didn't know that before. Why didn't you tell me?"

"What use?" replied Pam calmly. "That why they send me with you."

Two *tlatos* were built under a big tree. Not again did Pam propose to be caught napping as he was during the visit of the coral snake. Into one of the huts Osborn was carried by Deering and the encumbering belts removed. It was not long before the patient fell into an uneasy slumber.

Deering quietly made for the open and looked around him with an awesome interest begotten of the bloody associations of the spot.

The forest round about was unusually dense, the thickly woven canopy of leaves completely shutting out the sunlight, leaving a green gloom in its place.

Right ahead was a clump of moira piranga trees, the wood of which resembles that of the black walnut of the north. While not of large growth, they are somber of leaf and of bark—depressing in appearance.

It was at the foot of this clump, so Pam averred, that the corpses of the murdered men had been found.

Pam gave the details of the gruesome appearance of the victims' bodies.

The Texan shivered as he listened Pam, in spite of his broken English, had descriptive powers of a fluent nature. He omitted no details in this connection Deering shivered some more and prom-

ised himself that he would do his utmost to bring the murderers to justice.

Tu began to make preparations for a scout. He spoke to Pam in the Mundurucus tongue thus:

"I go to locate those who are about us. I think they are many; I know that they are hostile. The Mundurucus warrior feels the presence of his enemies and reads by the signs that the parrots and monkeys give him. It will be well for the Pama Manegele to watch and watch closely the forest while I be gone. Let thy eyes be as the eyes of the black jaguar who is hungry and seeks prey. When I come thou wilt hear the cry of the night heron. So shalt thou shoot not, knowing that it is I!"

He slipped silently into the jungle depths, leaving the *mozo* to tell his words to Deering.

Osborn did not improve with the passing of the hours. Toward six o'clock he was in a burning fever, punctuated by spells of delirium. Deering was in the act of giving him some quinin after one of his spells when the harsh cry of the night-heron rang out of the jungle depths close by.

Following it came Tu.

As Deering left the patient for a moment to hear what news the scout brought, Tu beckoned Pam toward him.

"Tell the *señor* to fill his rifle and quench his fire-stick, for the Piros are many and close at hand," he said hurriedly. "They are even now getting ready to spring on us like a tiger-cat. With them is the white jararaca. May the sucuruju destroy him!"

Pam did as Tu had said. Deering did not hesitate on a plan of action.

"Tell Tu to ascend the tree and guard its east side with his blow-pipe and poisoned arrows," he ordered. "We will bring Señor Osborn into the *tlato* on the west side, so that we shall have the protection of the tree-trunk. If they try to rush us, pick off the leaders and fire rapidly. Tell Tu to do likewise."

The *mozo* did so, and the Indian ascended the tree with the agility of a wildcat. Then Osborn was carried into the hut and laid on a pile of leaves. Deering and Pam crouched low and waited.

"What's up, Harry?" asked Osborn in a weak voice after five or ten minutes had elapsed. He was unconscious when brought into the *tlato*. His voice startled the others.

"Nothing much," replied Deering with a warning glance at Pam. "We're allowing that there may be unfriendly folk around and we're waiting to give 'em a smokeless welcome."

He spoke with a cheerfulness that he didn't altogether feel. Osborn never dreamed that the Texan was reserving one cartridge in his automatic pistol in order that if the worst came to the worst his friend would not be taken alive by the Piros. The situation was a desperate one, and Deering realized it.

"Pity I can't take a hand in the game," murmured Osborn drowsily. "If—I—could I'd—I'd—"

He became unconscious again.

Fifteen minutes passed. Deering could feel the perspiration trickling down his body. Twice he passed a rapid hand across his eyes to clear them of the moisture that descended from his forehead.

The forest seemed filled with ominous sounds. The cry of a bird or an animal set the hearts of the men beating and their senses questing.

The Texan prayed that something might happen, no matter what the result might be.

All at once from the tree overhead came a soft, sharp "pouf," followed by a yell in the underbrush, about ten or fifteen yards away.

The *mozo* touched Deering on the arm.

"Tu has killed," he said fiercely. "They come now? Me shake hands with you, *señor*. Mebbe no chance later."

Deering extended his hand and the *mozo* gripped it heartily. Both were cognizant of the imminence of the peril that confronted them.

If the first rush of the Piros was not stayed by the first volley from the defenders they were as good as lost.

The deadly pouf was heard again from above and again came a shriek from the forest. Tu's little tube was doing its work.

A flash and a snapping report answered the blow-pipe and a shower of leaves fell to the ground.

At the same instant a dozen jets of flame broke out of the jungle to the right of the *tlato* and the leaf-roof of the hut fell to pieces.

The Piros were once more shooting high.

"Don't fire until you can see your man," cried Deering. Pam was in the act of taking a shot at the underbrush. "They'll break cover now! Watch out!"

He had his rifle at his shoulder, ready to pull trigger when the first Indian made his appearance. Pam was awaiting in a similar position.

There was a moment's suspense, and far in the forest, to the left, came a volley of rifle shots, followed by an unmistakable civilized yell and cheer.

Another volley and another cheer and there broke through the jungle a dozen or so armed white men, in the midst of whom was Piqui-trai the Carripuna chief.

CHAPTER XX.

An Interrupted Battle.

DEERING and Pam sprang simultaneously out of the hut and advanced toward the newcomers. Piqui-trai, as he caught sight of Deering, leaped to the fore and gave the sign of high welcome. The leader of the others —a tall, slim, pleasant-faced young man followed and held out his hand to the Texan.

"This is Mr. Deering, I imagine," he said. "My name is Watson. I am in charge of Camp 29. The rest of my men belong to the camp force also. I am very glad to meet you, seeing that I've done so in the nick of time"

"And I'm pleased that you did so, Mr. Watson," replied Deering, as he shook the other's hand heartily. "If you hadn't, it's likely that the pay of your camp would have been held up again. I'm free to confess that before you showed up I had my doubts whether the money would reach the boys"

"You have to thank your copper-colored friend, who seems to be an acquaintance of yours"—he glanced at Piqui-trai—"for our arrival at the psychological moment. He showed up early this morning at camp, having paddled up the Manuel River, and hunted up a couple of tribesmen who are working for us.

"These fellows in turn got our interpreter on the job, and through him we learned that you were being surrounded by a bunch of Piros Indians who proposed to wipe you out this evening.

"The Carripunas also talked about a mysterious party who was behind the Piros, but we couldn't make head or tail of this part of their story. At first we were not inclined to believe the yarn, for our Indian chums practise all kinds of dodges to get a meal or cigars out of us.

"But this gent with the feathers behind his ears, through the interpreter, gave a minute description of you and your party. He told us how you saved the life of his uncle and declared you were a blood-brother of the tribe. I concluded that I ought to meet you. I'm glad that I did so."

"I'm sure heartily glad that you did. So is my *mozo* and Tu, our hunter. Osborn, who is with me, is in the hut, down with fever. Make me known to the men, if you please."

Watson did so. Then Deering addressed Piqui-trai through Pam, asking him how it was that he wasn't turtle-hunting.

"Tell our brother," replied the Carripuna, "that when we last left him we heard that peril would beset him for the rest of his journey. His life is worth many turtles.

"I sent nearly all my tribe to where the turtles gather. I myself and six of the bravest of my young men have been watching the Piros who would destroy him and they who were with him. We watched unceasingly. They gathered like ants to feast on a dead tapir.

"Last night we learned the cause of their gathering. The camp was near, even the camp to which my brother's footsteps pointed. The Piros knew that their chances were lessening as the camp drew closer.

"The white man of wicked counsels spoke to the Piros, urging them to waste no time.

"Then I took a canoe and paddled by night to the camp of the white men.

I led them to where the Piros were to lie hidden. Now, I go to my people who snare and harpoon the turtles. Shall I not soon meet the tribe-brother at the island of the assai palms?"

"Tell him that I'll assuredly be on hand in a couple of weeks' time," said the Texan to whom Pam had translated the speech of the chief. "Tell him, too, that when I come I shall bring with me many things that his heart desires."

"He say he content. He know you keep word. He wish you Carripuna for good luck," replied the *mozo*.

Piqui-trai faced Deering, raised both arms above his head, and soon was lost to sight in the jungle.

"Good thing for you that fellow tipped us off," said Watson. "How did you get to know him?"

"It's a long story and I allow that it will keep," said the Texan. "Tell you when we get to No. 29. Do you wish to get on the trail to-night or make camp here until the morning?"

"The going through the jungle in the darkness isn't pleasant," replied Watson. "I think that we'll hang out here until sunup."

"Good. We'll see if we can fix you up with something to chew on. Where is Tu?"

The query was addressed to Pam. The *mozo* made a gesture in the direction of the forest.

"Gone get game," he said briefly. "Mebbe come back with dead Piro to eat," he added with a grim smile.

"Well, we'll have to wait for our dinner," smiled Deering. "If you'll excuse me I'll take a look at our invalid."

Osborn was sleeping quietly. The Texan listened to the regular breathing of his friend, felt his pulse, and passed his hand over the other's forehead. The symptoms were of a favorable kind. With a sigh of relief Deering stepped out of the *tlato* and rejoined Watson and the others.

It doesn't take long for men who have been introduced to each other by danger to become well acquainted. In a few minutes Deering was chatting with the crowd as if he had known its members all his life.

Tu did not put in an appearance for over an hour, but the white men knew it not, so engrossed were they in their talk and the novelty of meeting new faces.

The Mundurucus happened across a turkey roost. He brought home four across his shoulders and one in each hand.

But the content that was pictured on his face was not altogether due to his hunting luck. As he subsequently confided to Pam, he had discovered signs of the fatal work of his blow-pipe, two Piros having fallen victims of its barbs.

The dead or dying savages had been carried away by their companions, the indications of this being clear enough to Tu. The Mundurucus had amply honored his blood for blood oath!

The dinner that night was supplemented by the rations brought along by the rescuing party.

While the white men ate, Pam and Tu kept watch. The wary *mozo* did not propose to be caught napping, but the fear of rifles and Tu's darts had entered the hearts of the enemy, and the party dined in peace.

At about nine o'clock Osborn revived sufficiently to be told of the arrival of Watson and his men. He and Watson were already acquainted, and after the couple had talked a little, Osborn dozed off again and put in a good night's sleep.

Tu and Pam were relieved of sentry-go in due season. Guards were posted for the night. The rest of the men made themselves *tlatos* and turned in.

The only interruption to the peace that followed was caused by a hungry jaguar, who, smelling the remnants of the turkeys, roared in the undergrowth for an hour or more.

The reception that the paymaster and his companions found awaiting them at Camp 29 was of a boisterously hospitable sort. Osborn had been brought along in a litter made of the men's ponchos and tree branches. He was weak but cheery at the end of the hike, but, like Deering, he was mighty glad to be free of the weight and responsibility of the money.

After the gold was turned over to Watson, the Texan sent a detailed report of the trip to Mr. Mannering, supplementing it with a request for permission to attempt the running down of the murderers of Payson and his *mozo* and the recovery of the stolen money.

"You will, of course, understand, sir, that such expedition would be of a tentative kind," wrote Deering, "and that I would guarantee nothing in the way of results. Yet I believe that it would be justified. The expense to the company would be comparatively small, and I presume that you could give me at least three weeks or a month in which to accomplish what I set out to do.

"If you accede to my request, will you please instruct Mr. Watson to let me have such supplies as may be needed for the use of myself and those who will take part in the expedition? I shall take the men who accompanied me on the trip to this camp. I shall also need tobacco and cloth with which to pay the Indians who are to accompany me and whom, I think, will afford me valuable assistance."

The report and letter were entrusted to a couple of trusty half-breeds, who used a canoe for part of the journey and then took to the jungle. The news of the Texan's safe arrival at the camp had already been sent to Mannering per the company's telephone to Jutupica. Two months later the messengers brought back a reply. Mannering gave Deering a free hand in regard to the expedition, and instructed Watson to honor any demand for supplies that the Texan might make.

Deering had four days in which to prepare for the start and get in touch with Piqui-trai. Osborn was on his feet again and gaining strength hourly.

Pam and Tu were eager for the expedition. The Texan himself was in fine fettle

On the morning of the fourth day the quartet embarked in a large canoe paddled by four Carripunas. The Manuel at this point ran swift and smoothly, and the indications were that the trip would not occupy more than an hour or two.

Outside of Deering and his associates, only Watson knew the object of the expedition. Not that the Texan mistrusted any of the members of Camp 29, but there was too much at stake to take chances on the purpose of the trip leaking out and perhaps reaching the ears of Guila or his emissaries.

Deering's plans were of the vaguest. He had a nebulous idea of striking to the eastward after meeting Piqui-trai. Then well, he didn't know quite what.

Perhaps the shadowy clue given by the Toucan, the lame Carripuna, about the gold pieces that he had seen Guila handle, might pan out; more likely it wouldn't.

Perhaps luck might put him in the way of getting his hands on the wily Spaniard; but even if it did so, he was by no means clear as to the course that he ought to follow.

He had no legal proof that his beliefs regarding Guila were correct, although he was morally sure they were.

It was true that Tu had heard the Spaniard discuss with the Piros the capture of Deering and Osborn, but the testimony of the Mundurucus wouldn't be worth much in the courts even if Guila was arrested and taken to Jutupica.

The only feasible plan, it seemed, was to catch Guila red handed or under such circumstances as would unmistakably indicate his guilt, past or present.

Deering pondered the problem until the assai island drew in sight, but without reaching its solution.

Finally he came to the philosophical conclusion that he would not anticipate difficulties. He would deal with events as they presented themselves and trust to Providence for the rest.

The island was in mid stream. It was oval in shape and about eight acres in extent. It was fringed with tall, flowering iris and rushes, and right in its center were half a dozen magnificent trees of the species from which it took its name.

When the island was first sighted it was apparently deserted, and Deering's heart went into his boots. Osborn glanced at the Texan and shut down the "jolly" that rose to his lips as he saw the anxious and disappointed expression on the other's face.

CHAPTER XXI.

Man and Gold Disappear.

THE expedition got under way, the disposition of the men being as Deering had ordered. Just before the start Piqui-trai explained to the Texan that the march through the jungle would

probably consume five hours, after which the comparatively open country that lay along the swampy mouth of the Ushushi would be reached.

He added that if an attack were made it would probably take place while the jungle was being traversed.

Two hours passed and nothing out of the ordinary happened. Then the report of a rifle rang out near the advance guard and one of the Carripunas fell writhing to the ground.

Deering and his companions pressed forward to the sound of the shot, the scene of which was hidden from them by the intervening forest.

As they came in sight of the group they saw Tu vigorously waving to them to keep back. Huangano was slightly in advance, talking loudly to some one in the forest in front.

The Texan realized the situation in an instant. He sank in the undergrowth, motioning the others to do likewise. He despatched Pam to the rear to stay the advance of the rest of the Carripunas.

For half an hour or more the Great Peccary talked, accompanying his words with many violent gestures. The afternoon breeze brought some of his phrases back to the white men, and the vehemence of the oratory was unmistakable Then he stopped suddenly and sank in a squatting position in the undergrowth.

Ten minutes elapsed and nothing happened. It was easy to see that Tu was possessing his soul in patience which was more or less assuring. Some of the rearward Carripunas arrived and squatted behind Deering.

All at once three unarmed Piros stepped out of the jungle, bearing green branches. Deering stared as if he could not believe his eyes.

"Wally," he whispered, "I sure believe that our man has won out. That green—"

He stopped, for Tu had risen and was beckoning to him to come forward. He needed no urging and, accompanied by Pam, who put in an appearance at this juncture, was with the group ahead in short order.

It was as he had hoped Huangano's oratory, plus his convictions, had done the trick. The Piros were quite willing to join forces with a stronger witch-doctor than the Fire Master, especially when the former had guns and other things for the giving. It was purely a matter of business with the savages. The richest or most powerful person could command their services. Huangano had persuaded them that such a person was Deering. So Guila had the shake given him then and there.

Deering, after a talk and distribution of cigars to the trio of chiefs, made one stipulation with them. This was, that they were to deliver into his hands the Fire Master, alive or dead. Their reward was to depend on which condition he was so delivered; double the amount of cartridges for him alive as compared for what they were to get for him if dead.

It was also arranged that the Piros men in general were to wait in the neighborhood of the peace parley until the return of the Deering forces from the Flat Rock and the river of the gold sands, lest there should be any clash between them and their ancient foes, the Carripunas, who were to accompany the expedition as far as the Ushushi. Huangano, however, was to go along as the representative of his tribe.

The Piros were asked as to the whereabouts of Guila. They replied that he was not far away, just where they could not say. But that "their prisoner's strings were ready for the tying" when he showed up.

"Nice friends, these," commented Osborn, as Pam translated. "Sell you out to the highest bidder. One would almost think that one was among one's Wall Street chummies."

It was late in the afternoon when the Texan's party struck the delta of the Ushushi and made its way a little to the southward to where was the Flat Rock of the Charapas. It was not long before the formation was sighted. It covered perhaps a half-acre, the tall rocks standing sentinel fashion around the central and recumbent rock

Up to this time it had not occurred to Deering that canoes would be wanted to cross the river to the rock. He said as much to Pam who, in turn, put the question to Piqui-trai The latter shook his head and replied that the water was so shallow that it could easily be waded provided that the wader knew of the quicksands with which the river-bed

abounded. He had such knowledge, and was prepared to lead the way when Deering was ready to cross.

"Good," said the Texan, who was examining the rocks through his field-glasses. "That'll make matters easy for us when we begin investigations on our way back for the gold river if it exists."

"The rocks seem to be full of holes and crevices." It was Osborn who spoke. He, too, was using his glasses. "So does the Flat Rock itself. We'll have to do a heap of rummaging before we locate the Guila safe-deposit crannies, I'm thinking."

"Maybe," replied Deering. "That Spaniard is a wise old steer. Anyhow, we're morally certain that the company's cash is somewhere in those rocks. And we'll get it."

Deering's lips came together in a straight line and his chin squared itself as he spoke. He proposed to accomplish what he had set out to do.

The advance guard was halted and instructed to hold the rear guard when the latter reached the Ushushi. Then the Toucan was put in charge of the Carripunas. The white men, Piqui-trai, Pam, and Tu pushed on toward the gold sands.

The river to which Piqui-trai now guided the party was about five miles from the Ushushi and, like the latter, a tributary of the Rodo, but it was much smaller than the Ushushi. It ran through a strip of alluvial territory and apparently had its source in mountains that lay to the eastward.

To the joy and astonishment of Deering and Osborn, the stories told by the Carripuna chief of its sands, rich in the precious metal, were true.

The yellow metal, mixed with a black sand, lay in pockets and streaks at frequent intervals along the bottom of the shallow stream. The party gathered several ounces of the dust during an exploration that lasted from noon till sundown.

Deering, who had had some prospecting experience, decided that the river cut through the mother strata at some point of its course, probably in the distant mountains. The dust was the result of the attrition of the water working on the larger nuggets in the space between the mountains and the point at which the party was standing.

Deering expressed his thanks to Piqui-trai through Tu, and taking from his watch-chain a Masonic charm, handed it to the Carripuna chief. It was the only thing handy that he had to give in order to show his appreciation of Piqui-trai's information.

The chief took the charm reverently, gazed at it with awe, and gave it the salutation reserved for the gods of his tribe while muttering to himself.

Tu spoke to Pam. The *mozo* grinned.

"Piqui-trai think he have fine medicine charm. Same that make you all safe and lucky," said he to Deering.

The Texan didn't think it worth while to contradict the belief of the savage, who was now pouring out his thanks in voluble Carripuna for the gift.

When the party got back to camp on the Ushushi they found that the savages there were impatiently awaiting them. A runner from the Piros had just come in to tell Deering that not long after he had made terms with the tribe, Guila had shown up. When he learned the situation of affairs "his brains boiled," as the messenger expressed it. He threatened, prayed, and tried to bribe.

But it was all to no purpose. The Piros had in mind the terrible witch-doctor of which Huangano had told them, also the presents promised them by Deering. Maybe, too, they were somewhat tired of the tyranny that Guila has exercised over them. Anyhow, they wouldn't budge from their promise to the Texan.

When he found that the game was up the Spaniard opened fire on his late allies first with his rifle and then with his revolvers.

Among those who fell dead was the chief who, together with Huangano, had visited the Deering camp at the outset.

Guila continued firing until he had exhausted all his ammunition. Then he took to the jungle. In spite of the fact that he left a half a dozen slain behind him, the Piros were in such awe of him and his alleged supernatural powers that they made no attempt to pursue him. Instead, they sent for help and direction to Deering.

The Texan acted promptly. He sent back by the messenger a box containing two hundred cartridges to the acting chief of the Piros.

"Tell him," he said, "that the Fire Master has no longer medicine-power for evil. Let the chief be not afraid. To-night, he shall post his young men round about his *tlatos,* each with his rifle. They shall shoot if they see or hear the Fire Master. I send the little deaths with which they shall do the shooting. To-morrow, I come myself."

"I'll bet a hatful of the dust to a stale tortilla that that Spaniard is in this neighborhood," said Deering after the Piro had departed, "trying to get a line on our movements. He'll want to fill up those empty cartridge belts, too. Guess he stores his reserve stock on the Flat Rock. But I'm tuckered out. He'll keep till morning."

CHAPTER XXII.

The Warning Beetle.

AS was usual with the Texan, he was up and about before sunrise. Osborn was an early riser also. On this occasion, though, the New Yorker was sleeping soundly when Deering crawled softly through what answered for the door of the *tlato,* buckled on his pistol, and started for a stroll.

The Flat Rock had mixed itself pretty thoroughly with his dreams and he wanted to study it out by daylight and by himself

It was an exquisite morning. Cool for the tropics, the combination of heavy dew and early sun drew from the flowers and foliage a mixture of odors that refreshed the nostrils.

Superb orchids flamed from the boughs of gigantic trees. Occasionally a gust of the breeze begotten of the dawn parted the canopy of overhead green, revealing for an instant the aerial garden that is generally hidden from the traveler

Half of the trees of a Brazilian jungle bear magnificent flowers, but invariably on the topmost twigs. Only when aeroplanes have become as common and reliable as taxicabs, shall we be able to view and revel in the floral opulence of these forests

Lost in the charm, Deering walked and walked along the edge of the Ushushi until he reached a tiny promontory shaded by a clump of feathery palms. The beauty and the coolness of the spot were irresistible. He walked out to the extreme end, seated himself on the white sand of the margin, and leaned luxuriously against an inviting rock.

For a wonder there were no mosquitoes around. The lap-lap of the water was soothing. The whisper of the leaves overhead was charged with somnolency. It wasn't long before the Texan was in that blissful state of being wherein one hovers between wakefulness and slumber —a condition that yields one a foretaste of Nirvana!

Perhaps for an hour he sat and dreamed. Then all of a sudden the veil of semi-unconsciousness seemed to be torn from his senses and he was widely, keenly awake.

He found himself listening for he knew not what! Yet there were no sounds audible except the bird and animal cries and the purling of the river.

From the thicker forest behind him came an occasional muffled crash; but this, he knew, was due to the fall of some huge nut-pod from its parent bough to the ground.

As he sat with his senses tensed to their utmost a huge beetle, gleaming like an animate sapphire, crawled from the underbrush onto his foot. The vivid coloring of the insect caught his eye. Forgetting the warning instinct, he bent down to examine the jewel-like creature.

This action saved his life. As he stooped, Guila, who had been concealed behind the palms, leaped at him, stiletto in hand!

The intent of the Spaniard was to strike at the spine of the Texan. As it was, the unexpected movement of the intended victim resulted in his assailant not only missing his aim, but nearly going head over heels. Guila barely saved himself from so doing by clutching the neck of Deering.

Even as the Spaniard seized him the Texan realized what had happened. Presence of mind was no figure of speech as far as he was concerned. The incidents of ranch life are calculated to develop the knack of recognizing and meeting emergencies. Consequently Deering acted as the situation demanded.

Instead of attempting to resist the impact, he yielded to it, and let himself go as Guila landed on him. The

Spaniard was thrown forward and over Deering's head. Before he could rise from the ground the Texan had him by the throat.

But the end was not yet. Guila made a wicked upward thrust with the stiletto, which, in spite of his fall, he had managed to retain.

Deering saw the movement and struck the blade aside, getting a bad gash on the back of his hand as he did so.

The sting of the green wound roused the fighting animal in him. Releasing his grip on the other's windpipe, he let the Spaniard have a straight right drive full in the mouth.

As Guila reeled back, the blood jetting from his lips, Deering seized the hand that held the stiletto and, wrenching it smartly, secured the weapon. Also, he drew his gun and leveled it at the staggering scoundrel.

For the moment the Texan was tempted to pull the trigger. The thought of the poor fellows who had been murdered by the man, the manner in which his own life had been attempted, the cruelties and kidnapings of the savages — all prompted the Texan to send a bullet into the body of Guila.

Then the respect for law that is characteristic of the white race, plus the dislike that every brave man feels to killing in cold blood, prevailed. The Spaniard should be taken back to camp and, in due season, be turned over to the authorities.

Deering reflected with grim comfort on the fact that Guila could not escape the penalty of his crimes by bribery, as is not unusual in Brazil. The authorities would not dare to ignore or palliate a charge brought by the contracting firm that was so close to the government.

Keeping the man covered with his gun, Deering waited until his dazed senses recovered. Then he spoke to him in Spanish, ordering him to walk in front of him in the direction of the camp.

Guila, spitting out a tooth or two, tried to grin.

"I did not know that the *señor* spoke Castilian," he said.

"There's lots of things you don't know," replied Deering. "One thing you'll know before long, though."

"This being what, may I ask?" The Spaniard's tone was soft and silky, as if the person whom he was addressing was his dearest friend instead of a man whom he had just attempted to assassinate.

"Just how hot the place you are going to is!"

Guila spat more blood and smiled again.

"It is getting hotter here, and I am thirsty. Will the *señor* object to my quenching my thirst at the river?"

"No! Get a move on! The boys are waiting for you at camp! Remember that while you're drinking I'm covering you with my gun."

The fellow went to the river brink, lay flat on his belly, and drank. He washed his face clear of blood-stains. Then he rose and faced Deering.

"I am ready, *señor*," he said. "And would it be considered impertinent if I ask a question?"

"You may ask as many as you please," replied the Texan, whose nerves were beginning to fray by reason of the uncanny politeness of the Spaniard, "but it's up to me whether you get any answer to them!"

"Why, then, did you not take my pistol away from me when you gave me such a striking proof of your prowess just now?"

"Because I knew that you spent all your cartridges on the Piros! You haven't had a chance to get to the Flat Rock where you keep your bank and your reserve ammunition since you did this slaughter!"

Guila's eyes went to pin-points.

"Candid, if not flattering," he laughed softly.

"Anything else you want to know, you — you —" Deering swallowed hard.

"And after you have handed me over to the authorities, I suppose you will visit the Flat Rock to ascertain if your insane ideas about it and myself are correct."

Guila smiled the smile of a fiend.

"Wrong, you cabrone!" cried Deering, who was becoming exasperated at the cool insolence of the fellow. "We're going to go over the Rock, inch by inch, as soon as I've got you tied up in camp. As to the 'insane ideas,' it won't comfort you to know that the Piros have given you dead away. We know where

you have stowed away the result of your last murders."

"Ah, well! It seems to me that the *señor* has got me what is it you say—yes, got me cold. It is enough!" Guila smiled cynically. "Will the *señor* permit me to present him with something that will be of no further use to me?"

Deering did not reply. Guila's hand slid to his bosom. The Texan's gun covered him instantly. The Spaniard's hand was withdrawn — but it held a small bag.

"This holds gold," said Guila. "If the *señor* and myself had met on more friendly terms, I might have shown him from whence I obtained it. As it is, I offer it to him so that it shall not fall into the hands of those animals, the Piros—may the devil eat them!"

He advanced and extended the bag to the Texan.

"Take it, I beg of you, *señor*," urged the Spaniard, coming a trifle closer. Then, without a hint of a warning, he whirled on his left heel and his right foot shot backward, catching Deering full in the pit of the stomach.

Guila had used a movement of the French *savate*, or foot boxing

As the Texan, faint and nauseated, staggered backward, Guila, with a cry of triumph, made for the river and began to wade toward the island. In a few moments Deering partially recovered himself and started to follow. It was then that he noted that the fugitive, instead of going straight ahead, was following a sort of zigzag course through the water.

Deering knew that the river-bed was full of quicksand, and a conviction of the diabolical ingenuity of Guila came to him. That individual had manifestly counted on Deering following him after recovering from the kick and being engulfed in the treacherous sands.

So, with drawn pistol, the Texan watched the other make his devious way to the Rock. Even as he did so there came from the jungle to the eastward shouts and pistol-shots. Osborn and the others, alarmed by his prolonged absence, had organized a search-party.

Two shots, twice repeated from his own gun, brought the party to his side. In a few words he explained the situation to them. The Spaniard was now close to the Rock. Once he paused to look back. The sight of Deering's reenforcement seemed to strike him with sudden panic.

Nearby an outcropping of low rocks running parallel to the rock itself offered partial cover. For this refuge he dashed and reached it safely.

Osborn turned to Deering:

"What's the next card to play?"

"Piqui-trai is the ace in this game. He'll show us the way through the quick sands to the Rock. Guila is out of cartridges and can't do any damage."

In a few moment the invaders, headed by the Carripuna chief, started for Guila. That party must have been on the outlook, for scarcely had a dozen yards been covered by the others, when he dashed out of his hiding-place and waded the strip of shallow water that lay between him and the Rock.

Once on the Rock, he turned, shook his fist, and hurled virulent Spanish at his pursuers.

Deering flushed angrily as he listened. Pam brought his rifle to his shoulder and drew a careful bead on the Fire Master. The Texan struck up the weapon.

"Wait, and let us see the ending of all this," he ordered.

The advance on the Rock was resumed. Guila watched for a few moments. Then he shook his clenched fists once more and sank to the ground.

A faint curl of smoke arose near him. A pause ensued during which one might count six or eight. Then there was a trembling of the ground and the river-bed. The usually quiet waters of the Ushushi rushed shoreward and back again. A dense curtain of black smoke, accompanied by a terrifying roar, enveloped Flat Rock.

Above the vapor rose not only the fragments of the rock, but of a human form also!

Guila had blown up his cache of stolen treasure and himself at one and the same time!

By some miracle the Deering party all escaped severe injury. What the explosion failed to accomplish, the quicksands completed. Between the two, the stolen gold completely disappeared.

(The End.)

Getting Old 463 Ready

BY DONALD FRANCIS McGREW

Clancy Encounters a Persistent Jonah, Which Spoils His Prospect of a High-Ball Run.

SOON after I got through doing the ten days' time old McGugin gave me, I was called out with Frank Smith, whose wife by that time had recovered from her illness, for first 83, on time, engine 463.

I hopped out quick, for that was a highball run on the short end of the division, and, with Frank Smith, I saw some easy money ahead.

"Don't need any lunch this trip," I said to the boy at the beanery, as I bounced in with my water-jug, lamp, and tin suit-case. "We're going to have a highball run."

"Knock wood," says the boy. "You're never in until you're in on this road."

"Aw, brown the wheat and let two white wings fly up and down," I grinned. "There won't be anything left behind us but smoke and a gray streak."

Well, I highballed out of there as soon as I threw the feed into me and went to the roundhouse, where I changed my street clothes for overalls and jumper.

Putting on my black cap, I see I'd forgotten my gloves. The call-boy wanted to lend me a pair of leather gloves, but I can't use them firing, as the heat stays in 'em and near scorches the hand off me—especially the left, which gets nearest the fire door when you're lopping one into the back corners.

I got a pair from a machinist, saw that we had an hour and a half to get her ready in—we pulled out at 12.20 A.M. and then started out through the dark to hunt her, whistling as I went.

I found her just beyond the ash-pits. She was quiet, and I missed the sound of the blower.

"Gee," I thought, as I climbed into the gangway. "That hostler must have her hot already. Bully for him."

I had another guess coming, though. When I had placed my tin grip in the fireman's seat-box and lit my lamp and the cab-lights I saw that she had only forty pounds of putty. Open went the fire door. That jasper hadn't put over twenty chunks of coal on top of all that wood—and there was a fire for me to build up.

"Wonder what that hostler is drawing his pay for?" I says to myself. However, I reached for my lantern and looked for the scoop.

No scoop was on her; neither was there a coal-pick or any valve or signal-oil. Furthermore, the chains were still down, just as they had been left when she came in off her run. Nothing but slack was left in the back of the tank.

"I 'low I'll jack that oil-boy up!" I says, getting down. And just then I did a toboggan on the ice on the gangway step, hurting the pipe in my hip-pocket. That didn't improve my peace of mind any.

"See here," I says, stumping into the long, dingy, low-ceilinged, smelly oil-house. "What are you doing on this road—cutting coupons or putting toots on the engines?"

"Cuttin' coupons," he says, going on with a can he was wiping.

"Well, cut a few over in the direction of the 463, which needs a few things like oil and waste and coal-picks and a scoop,

and I'll be much obliged to you. And, say, have you got a long handled scoop for a short man like me?" I asked.

"Here's the only long one we have," he says. He handed me one with a handle on it as long as a pitchfork.

"Say," I says, "I don't want to pitch hay! If I had a rubber handle on it maybe I could use it. Haven't you got anything better than that?"

He hadn't, so I took the best two I could get—always thoughtful to have one for the head shack, you know, when the Barbado kernels get back in the tank.

"And look here," I says. "If that isn't a hot-oiler to hand out to any hogger. Look at the spout! It's cracked so the eruption looks like a shower-bath. Then you report a hogger for running over his oil allowance. And this tallow-pot, too. Why don't you introduce it to a little solder, eh? Why don't you——"

"Why don't a cow give cheese?" he yelled as I was drawing breath. So I picked up my junk and left. If any one can get any satisfaction out of an oil-boy on the Y. R. and C., he's a better tallow than I am.

When I got back, there was the coon hostler just turning on the blower.

"Say, Joe Gans," I says, "where've you been? Shooting craps in the round-house? Why ain't you coaled up this hog?"

"'Deed I ain't been shooting no craps," he says. "Got to take a little water in dis 'jine before we goes to the coal-chute."

"Well, get a move on, then," I told him.

"Oh, plenty time, plenty time!" he grinned and reached for the scoop.

"You lay away from that," I said. "You'll ball that fire up for me."

I put one in myself, opened the blower wide, and, while she was getting up enough steam to spot her under the crane, I hooked up the chains and placed the lubricator in the door-ring to heat.

Then, as we were first 83, I looked up in the rack for the green flags. There were two white ones, a red one, but only one green one. So I had to doctor up one. Cutting the green flag in two, I split off a strip of the rack with the coal-pick, whittled it down on one end, and tacked on half the green flag.

Don't see the sense of carrying flags in addition to lights at night, anyway. But I took the two, went out on the running board on the left-hand side, climbed over the Westinghouse air-pump, and stuck one of them in the socket.

The marker-lamp on that side was all right and over half full; but when I dropped down on the pilot and up over the steam-chest and onto the other board I found the socket for the flag full of wood. Some one had broke off the last flagstaff.

I had to take off my glove, dig up my knife, and nearly freeze my fingers while I pried that piece out of there. I blessed that fellow who'd broke off the staff. I commenced to feel a rising gage right then.

Right on top of that my torch went out, and I had to walk back to the cab to get a light—couldn't strike a match in the little breeze that was blowin'. Me Irish, too.

When I got back there was the slide of the marker jammed so I couldn't open it without going back after a monkey-wrench to knock it loose with.

"By ginger!" I thought. "A man's got to have a navy yard machine-shop to get a hog ready on this line!" That's what I said, just like that. But I said worse when I got the slide up and found the lamp gone! I kept on saying it, too, all the way to the ground and over to the oil-house.

"You dig up a lamp for a marker right quick!" I told that oil-boy.

He dug it up, too, for I had blood in my eye by then.

"Now," I said to the hostler, when I got back to the hog, fixed and lit the marker, and saw that she had enough putty to spot her, "I'll handle the crane if you spot her, so we can get around and get coaled up."

Now I didn't *have* to do that and take chances of getting wet. But he would have had to spot the engine and take water, too, which meant more time. I was in a hurry by then. I got back over the tank with my glim and stood on the right-hand side as he pulled ahead.

Of course he pulled a little past the crane. I flagged him and thought he'd stop, and, when I reached for the crane, I nearly got pulled off for my trouble.

"Back up, you narrow gage bone-head!" I yelled at him.

Slam went the air, and back he come—this time ten feet too far back in spite of the cuss-punctuated stop signal I gave him.

"If you can't stop this engine, you sap-head, come up here and let me do it!" I yelled.

"Gimme a signal, boss, and I spots her right for you!" he yells back.

"Signal?" I retorted. "I give you a regular washout that time."

"I didn't see it, boss," says he

Didn't see it! I picked up a chunk of coal, but laid it down again. What's the use of wasting good coal on a hostler, I thought. I figured right then I'd get him this time, so before he went ahead I picked up the fire-hoe on the back of the tank and pulled the crane around.

"Now," I signaled, "go ahead easy."

When the crane came abreast of me I signaled him to stop. And just then my lamp went out.

"Whoa!" I yelled.

Did he whoa? Not a whoa! The crane struck me on the breast. I didn't have time to duck under. I grabbed at it; my heels dragged over the back of the tank; and then I hung in the air holding onto that icy spout.

If I'd caught that coon—well!

He had too good a start. So I got back, spotted the engine myself, and took water. There was a split in the blamed spout, too, and I got a bath free of charge at the manhole.

When I got back, I supposed by then that the valve-oil was hot enough to fill the lubricator. Grabbing the monkey-wrench, I twisted at the wheel to adjust the jaws. It wouldn't adjust worth a whoop.

The threaded shank of the lower jaw was full of grit and hardened grease, and hadn't had a coal-oil cleaning for a year, I guess.

There was oil on my gloves, too. I pounded and hammered and wished for a pair of pliers; finally, after five minutes of red-faced work, I managed to get the jaws adjusted.

I put them onto the filler-plug, thinking my troubles were over; I gave a pull; and—slip—nothing doing. Some lantern-jawed, would-be machinist had used a Stilson wrench on that brass filler-plug and chewed all the square edges off.

I took a deep breath and bathed that whole road in sulfur. And I gave that wrench a heave, too. But it never pays to lose what temper you've got.

I never looked where that wrench was going, and it took a bounce off the water-glass, and there I was in a cloud of roaring steam and cuss words. I got a few scalds, too, before I got the glass shut off, top and bottom.

When that had quieted down I threw open the fire-door to dry out my clothes. Just then I thought of the tallow-pot. Where was it, anyhow? I soon found out. Blazing up under the door was a smell of valve-oil. Me having forgotten to take it out of the door, that coon's slam of the air had knocked it onto the grates.

There I was with no valve-oil, no Stilson wrench, and a feeling like I'd grown all the wet feathers of a hen at once

I almost hesitated to try the gage-cocks for fear they would be full of scales or the seats would be worn out; but, on trying them, I found she had three gages of water and only one leaking.

Some one had strong-armed that one and ruined the seat, so I guessed I was due to breathe wet, steamy air all the way over the road. Down I got, then with my torch, and over to the oil-boy for another tallow-pot and a Stilson.

He wouldn't give 'em to me without an order from the roundhouse foreman. Away I went, cussin' him, the roundhouse foreman, the Y. R. and C., and the United States. My torch went out, too, and I stumbled into one of the pits on the way through the smoky roundhouse, skinning my shins.

"What are you doin', runnin' my hostlers off these engines?" says the roundhouse foreman, chewin' his mustache where his short cigars had burned it yellow.

"If this road had anybody working in the roundhouse save a lot of strong-armed, pin-headed, hog-jowled, would-be machinists and hostlers, I wouldn't have to be chasin' 'em off the engine!" I retorted.

"Young fellow," he says wearily, "you take this order and get out of here before I spank you."

So I left. When I got back with the new tallow-pot and the Stilson, there was Frank getting up in the gangway.

"Hello, Clancy," he says. Then, at sight of my face, he grinned in his slow way. "What's wrong with you?"

I ripped out the whole lay to him right there. I damned and cussed around till I was out of breath, him smiling the while.

"Guess I'd better not go out with you," he says, grinning. "You'll be digging into me next. But we'll pull round and coal up now, because we haven't got so awful much time."

I put in another fire and round we went to back under the big black coal-chute. I put the scoops alongside the seat box, but forgot my water-jug, which was sitting next the hand-brake on the tank.

When the back half of the tank was full, Frank spotted her for the front end, and when the coal was spilling over the top of the chains, I noticed that jug. I made a jump for it, and got a chunk on my toe for my pains.

"Yow!" I yelled. "Shut off that chute!"

He didn't, though. It kept on coming. Before Frank could pull ahead, there was coal piled clear to the door.

"Don't cuss any more," grinned Frank, when we stopped. "Our troubles ought to be over now. Gimme that Stilson and I'll take out this filler-plug."

I did, placing the tallow-pot in the door at the same time. Frank put the Stilson on the plug, gave a pull, and—rip—he'd twisted it clear off.

Frank didn't grin any then. *He* cussed the gov'ment a little himself While he oiled around, I goes back over to the roundhouse foreman for a machinist to fix that lubricator.

All busy. So I took a new plug and a hammer and chisel to back the broken one out with and beat it back. There was Frank upon the running-board monkeying with the air-pump.

"She's bucking," Frank says to me through the running-board door.

"Yes," I says. "And so's this boiler. I see she's got only one hundred and fifty pounds."

"Don't know whether she'll work or not," Frank says, coming in. "What's the matter? Boiler leaking?"

With all that green wood smoke I hadn't been able to see my flue-sheet before, but now I noticed it.

"No," I said, "them hostlers never cleaned the clinkers off it, that's all. Now I got to get that hook and hook 'em off."

Nice sweet job it was, too, with a fifteen-foot hook of one-and-a half Norway iron.

The head shack got on with his red light.

"Ready to head you out any time you are," he says. "Here comes first 83."

"I'll tell you when I'm ready," Frank growled from where he was backin' out the filler-plug with the chisel. Just then it came out, too, and as the seat of the valve to the condenser was leaking, Frank got a faceful of water and oil.

Wiping off his face with a piece of waste, he said to me: "Got them clinkers off yet? Good. Stick the tallow-pot in this lubricator, and, when I get down, try those sanders for me, will you?"

I did. Directly I heard him cussing "Any sand in that dome?" he yells. Out I went over the running-board and looked in. "Plumb full," I told him.

"Well, there won't either one of them work," he says. "Stick your arm down and see if the holes are plugged."

While he pounded the pipes, I fished around through the sand. There was nothing wrong in the dome. "Pipes plugged," I guessed. "Must have got a little water in them, somehow, and froze."

With waste and oil Frank built a fire round them, while I finished filling the lubricator and started it. Finally he got a dribble out of the sand pipes.

"Ain't you fellows ever going to get ready?" comes a voice out of the darkness. It was the roundhouse foreman.

"Gimme a piece of string," Frank retorts, "and I'll tie this old junk-heap together."

"You hoggers are always growling," snorts the roundhouse foreman. "You're holding up that train—better get a move on"

Frank got up in the cab and didn't say anything, because he had a family; but I didn't have any family, and I started to say something, only Frank grabbed my arm.

"Guess we can go now," he says, looking at the indicator, which showed one hundred and ninety-five pounds. I shut off the blower and we pulled out over the yard switches and down over the main, me ringing the bell. When we backed onto the train I started whistling "Casey Jones," for, I thought, "surely we've lost the Jonah now!"

We hadn't, though. Looking at the indicator, I see she'd gone down twenty pounds just running around light. I put on the blower, and says to Frank, who was watching the reservoir and train-line gages, "Frank, did you hear anything funny about that exhaust?"

"No," he says, "wasn't working her hard enough."

"Sounded peculiar to me," I says. "And look at that gage."

"Gee, don't borrow trouble," Frank groaned. "I wasn't working her hard enough to cut your green fire, that's all."

Well, I see she picked up with the blower quick enough, so I knew her flues weren't plugged and that the fire was all right now. Neither could her front end be full. The air-pump seemed to be working all right, so in a minute we gets the high sign from the train-crew. Frank whistled off, and we started.

Right out of the division-point on that short end is a grade. And on that grade old Mr. Jonah came grinning back again and put the final kibosh on me and Frank — me from the steam end and Frank with the sanders.

We hadn't gone a train length before the putty began to go down. I looked under the shovel at the fire. It was O. K. But she wasn't cutting her right. Poking my head out the window, I heard her sounding the "one, two, three, four" sound all O. K., so it wasn't her valves; however, that stack shook with a woozy, hoarse, unnatural cough.

"Bet you there's a split in one of the nozzles," I swore.

Frank was too busy to hear me. The old goat was slipping bad, and if you think hogging an engine is just leaning out the window with your hand on the throttle, get on a big hog where she's slipping on a hill.

If she slips too hard, and spins, she's liable to whip off her side-rods and driving-rods before you get her shut off; if you shut off too long, you're liable to stall; if you stall on a hill, you've got a proposition starting.

So there Frank was, slipping, easing off on the throttle, plugging at the sanders, catching her again just in time, and me bailing in coal and cussing a streak. And just there the air-pump stopped working.

"Take her, boy, while I see what's wrong," Frank yelled

Frank came back in saying he'd fix the pump after we made the hill, but at that minute there came a worse cough than ever from the stack, and I knew we were all in as to nozzle. That rusted-through cast nozzle had let go the rest of the way

"All in now," I said. "She's blowing half her exhaust steam right against the front flue-sheet."

I was looking out the window, telling my troubles to the sky, to the air, to the whole blamed universe, when, easy at first, then a little faster, we started rolling back.

"Get out on top and set those brakes!" yells Frank at the head shack "I haven't got enough air to hold her in the reservoir." With that he whistled for brakes on the hind end, too.

Before we stopped, though, we were half-way into the yards. Right in the yards where we started, and after all that trouble!

"Well," sighed Frank, "I guess we'll have to get a new engine and start again."

"Not *me*," I says. "I wouldn't get another engine ready for the whole division — no, not even the whole Y. R. and C.," I says. "It puts lumbago in your back and tears in your eyes and gray hairs in your head getting a hog ready to go out on this mortgage-ridden, water stocked, maintenance-economy, rusty-railed, old stage-coach of a road. I'm goin' home and get a feed and a bath and a bucket of beer. And if the round-house foreman sends a caller after me, I'll pulverize him on the spot!"

But I went out, just the same. Frank's a good fellow and Frank's got a family. He says he likes me, and that if I can't put putty in an engine, no other tallow on this line can. Which may be a little salve, but salve don't hurt. So I took it out in cussin' the 463 and went along on the new engine.

By the Light of the Lantern

Ask us what you want to know

WE want to be as useful as possible to our readers, but, because of the great popularity of this department, we are obliged to impose certain restrictions. It is limited to the answering of questions of an informative, technical, or historical nature only. All letters should be signed with the full name of the writer, as an indication of his good faith We will print only his initials The editor begs that readers sending in questions will not be disappointed if the answers do not appear as early as expected. It frequently takes weeks to secure correct answers, owing to the complexity of the questions.

G. S., Buffalo The Full Crew Law in the State of New York provides that a freight-train of more than twenty-five cars running outside of yard limits and on railroads more than fifty miles in length must be manned with a crew of not less than one engineer, one fireman, one conductor, and three brakemen. Any train of five cars or more, other than a freight-train, must have one engineer, one fireman, one conductor, and two brakemen; and, if it is a passenger or baggage train, it must have a baggageman in addition to the crew. Any freight-train of twenty-five cars or less must have one engineer, one fireman, one conductor, and two brakemen; and any light engine must have not less than one engineer, one fireman, and one conductor or brakeman.

W. B. B., New Haven, Connecticut—"Sabotage" is a word of French origin It is said to refer to the conduct of some French workmen who threw their wooden shoes, or *sabots*, into the machinery of a factory during a strike. The word is frequently used in labor troubles when the destruction of property occurs, when there may be said to be no suffering on the part of the laborer and the keenest kind of distress to the employer. It is used also in Europe to denote tampering with a railway track by removing the shoes connecting the ends of rails—a mischief not likely to be noticed until a wreck occurs

F. G., Rockford, Illinois.—The principal shops of the Florida East Coast Railway are located at St Augustine, Florida

(2) J. H. Nelson is general superintendent at St Augustine, Florida; C. G Wakeley is superintendent at New Smyrna, Florida, and W. M McDonald is superintendent at Miami, Florida

(3) For full particulars in regard to fast runs see May, 1913, RAILROAD MAN'S MAGAZINE, page 667

(4) The Chicago, Burlington and Quincy Railroad owns a controlling interest in the stock of the Colorado and Southern Railway

(5) In regard to the inventor of the screw reverse-gear it should be remembered that Archimedes was the inventor of the screw. Its application to the reverse-gear of locomotives occurred in the earliest experiments and has continued in use in Europe, and particularly in Great Britain, ever since

F. F., Chicago.—The National Railways of Mexico owns or controls the properties formerly known as the Mexican Central Railway Company, National Railroad Company of Mexico, Hidalgo and Northeastern Railroad Company, Limited, Mexican International Railroad Company, Mexican Pacific Railway Company, and the Tampico Harbor Company. It also controls, through stock ownership, the Interoceanic Railway of Mexico, Limited (Acapulco to Vera Cruz), the Texas Mexican Railway Company, the Vera Cruz to Isthmus Railroad, and the Pan-American Railroad Company

(2) The National Railways of Mexico and its controlled lines constitute a transportation line extending from the frontier with the United States in the north to the southern boundary with Guatemala, with the exception of a few miles covered by the Tehuantepec National Railway Company. The principal terminus of the company is the City of Mexico; the main line runs in a northwesterly direction to Ciudad Juarez in the State of Chihuahua, Mexico, opposite El Paso, Texas;

that of the National in a northerly direction to Nuevo Laredo, in the State of Tamaulipas, Mexico, opposite Laredo, Texas; that of the Interoceanic in a southeasterly direction from the city of Mexico to Vera Cruz

In the case of the International, the main line runs from Ciudad Porfirio Diaz, State of Coahuila, Mexico, opposite Eagle Pass, Texas, to the city of Durango, State of Durango There are various important branch lines, among them being the two lines running to the Port of Tampico, the line from Irapuato, in the State of Guanajuato, to Manzanillo, in the State of Colima, and the line from Monterey to Matamoras on the Gulf of Mexico.

C. C. F., Louisville, Kentucky.—You need not be afraid to ask questions about No. 13, or any other number of any locomotive. Besides the one in service at the terminal in Louisville, Kentucky, to which you refer, we know of several others bearing that number. We recall a No. 13 on a railroad in Iowa, where the engineer did a banking business in the cab of the engine by cashing checks for contract laborers. This was some years ago. He is now an official in the Westinghouse Air-Brake Company Locomotive No. 13 gave him his financial start in life

H. T. R., Madison, Wisconsin The leasing of the short road to which you refer by the Chicago, Milwaukee and St. Paul Railway does not in any way affect the ownership vested in the stockholders. Leases of this kind are almost always conducive to the welfare of the leased road as well as the operating road

J. M., Daysland, Canada.—The chief offices of the Illinois Central Railroad are in Chicago; the Seaboard Air Line and the Baltimore and Ohio, Baltimore. The Wisconsin Central is now operated by the Chicago division of the Minneapolis, St Paul and Sault Ste Marie Railway, with general offices at Minneapolis, Minnesota

L. F., St. Louis.—Your question, which is the finest all steel train in America, is one upon which we do not care to give an opinion. We thought the East was supreme until we saw the West There are quite a number of all-steel trains so completely equipped that comparisons are not necessary They are as near perfection as the skill of master constructors can make them

(2) The twenty-hour fliers from New York to Chicago run some part of the distance at a speed of over 70 miles an hour The average speed from point to point can readily be calculated by dividing the complete distance by the elapsed time. It should be remembered that in running westward one hour is gained on each fifteen degrees of the earth's circumference, so that when it is high noon in New York it is eleven o'clock in Chicago

(3) Water is taken into the tank of many high-speed locomotives while running from a pit cut between the tracks. This pit is filled with water, into which a scoop attached to the tank is lowered and the water rushes into the tank The scoop is raised and closed before the end of the pit is reached

D. J. B., Ashwood, Oregon.—The general custom is that a fireman must necessarily be employed some time on a switching and freight locomotive before being advanced to a passenger locomotive

(2) There is no particular reason for the levers, engineer's seat, and other appliances being on the right side of an engine. Signals and other appliances are adjusted to suit the usage that has grown with the locomotive As the grave-digger in "Hamlet" says, "Custom hath made it in him a property of easiness."

R. J. L., Wellsville, Ohio.—There is no mechanism attached to any locomotive whereby coal is taken into the tender while the engine is running.

(2) There is no railway known as the Lake Erie. There are the Lake Erie and Pittsburgh Railway; the Lake Erie and Western Railroad; the Lake Erie, Alliance and Whig Railroad, and the Erie Railroad

(3) In regard to fast trains see the RAILROAD MAN'S MAGAZINE for May, 1913, page 667

WHAT is the estimated number of railroads in the United States, Canada, and Mexico?

(2) Which is the best car for general use?—W. R., Central City, Nebraska

(1) Assuming that steam railroads are referred to, there are about 1,086.

(2) Steam cars are rapidly coming into general use, which is the best proof that they are in every way preferable

P. A. Y., Banff, Canada Faster time is made across the continent on the railroads of the United States than the railroads of Canada. The distance is shorter and the climatic and other conditions are less severe

(2) The valves on steam-chests, to which you refer, are known as relief-valves. They open automatically when the locomotive is drifting—running without steam—and regulate

the atmospheric disturbance caused by the movement of the piston.

(3) Some railroads claiming to be transcontinental lines are justified in their claims, although their lines do not extend across the continent. They connect with some other roads that enable the cars to continue their journey undisturbed.

(4) The Consolidation and Mikado types of locomotives are both extensively used in mountain service. The latter is the more powerful of the two.

H. S., Fond du Lac, Wisconsin.—There are 20 trainmasters on the Great Northern Railway. Those in Wisconsin are J. H. Hicken and J. M. Rooney, with offices at Superior, Wisconsin.

T. J. S., Kamsack, Canada.—The prospects for an American railway man in South America are not the brightest. We would not advise any one to risk going there in search of employment.

(2) Ingro L. Rapelli is general manager of the Central North Railway, Tucuman, Argentine. Samuel Gomez Pereira is engineer of the South of Bahia Railway, of Brazil. Franz Dorner is general manager of the State Railways of Chile, Santiago, Chile.

A TRAIN one mile long, with the engine at station A, runs to station B, a distance of ten miles. When it stops the caboose is at station B. The conductor was at the top of the caboose when the train started, and walked from the caboose to the engine. How far did he ride and walk? Answers vary here. My answer is that he rode eleven miles and walked one mile.—R. J., Copletis, New York.

He was carried through space twelve miles, and coincidently walked one mile.

APPRENTICE.—The Louisville and Nashville Railroad has no shops especially for apprentices, but employs apprentices to learn the various trades at all of its principal shops. These are located at Covington, Kentucky; South Louisville, Kentucky; Corbin, Kentucky; Howell, Indiana; Paris, Tennessee; Nashville, Tennessee; Etowah, Tennessee; New Decatur, Alabama; Boyles, Alabama; Mobile, Alabama, and Pensacola, Florida.

The term of apprenticeship consists of 12,000 hours actual service, divided into four divisions of 3,000 hours each. The pay for the first period is 11 cents per hour; for the second, 13½ cents per hour; for the third, 16 cents per hour; for the fourth, 20 cents per hour.

Apprentices should apply to the master mechanic at the respective shops.

The apprentice shops of the Chesapeake and Ohio Railway are located at Richmond, Clifton Forge, Huntington, Covington, Kentucky, and Peru, Indiana. The company has also what is termed a Special Apprenticeship Course, which admits technically educated young men to its shops.

The following table will give the length of time apprentices for the different trades are required to serve and the pay they receive while serving.

SPECIAL APPRENTICES

Pattern shop	2 months
Foundry	1 months
Tool room	1 month
Machine shop	6 months
Erecting shop	8 months
Car repairing	3 months
Drawing room	1 months
Roundhouse	6 months
Firing locomotives	3 months
Master mechanic's office	2 months

RATE OF PAYMENT

First six months	15 cents per hour
Second six months	17½ cents per hour
Third six months	20 cents per hour
Fourth six months	22½ cents per hour
Fifth six months	25 cents per hour
Sixth six months	27½ cents per hour

MACHINIST APPRENTICES

First year	11 cents per hour
Second year	13 cents per hour
Third year	15 cents per hour
Fourth year	17 cents per hour

BLACKSMITH APPRENTICES

First year	11 cents per hour
Second year	13 cents per hour
Third year	15 cents per hour
Fourth year	17 cents per hour

BOILERMAKER APPRENTICES

First year	11 cents per hour
Second year	13 cents per hour
Third year	15 cents per hour
Fourth year (1st 6 months)	17 cents per hour
Fourth year (2nd 6 months)	18 cents per hour

PIPE FITTER APPRENTICES

First year	11 cents per hour
Second year	13 cents per hour
Third year	15 cents per hour
Fourth year	17 cents per hour

CAR DEPARTMENT APPRENTICES

First year	11 cents per hour
Second year	13 cents per hour
Third year	15 cents per hour
Fourth year (1st 6 months)	17 cents per hour
Fourth year (2nd 6 months)	18 cents per hour

Young men between the ages of 16 and 21 desiring to enter the regular apprenticeship for the different trades should apply to the master mechanics and shop superintendent. Special apprentices are appointed by the superintendent of motive-power.

J. G. G., Goburn, North Carolina.—The railroad wreck referred to occurred on the Erie in 1863, at the junction known as Lackawaxen. It was caused by a misplaced signal. A coal-train collided with a train carrying Confederate soldiers while proceeding to the Elmira State prison. The most conspicuous fact on record is that there were seventy-six soldiers buried in one grave dug at the side

of the track where the accident occurred. There is no exact record as to how many died from their injuries.

J. M. M., Hibbing, Minnesota.—"Duty-paid" cars are those that pass from one country to another without being opened and their contents examined at the frontier. The contents are examined at the terminal where the car is loaded. They are vouched for and the duty paid for and receipted by the agents or officials of the country to which the car is destined. Cars of this kind pass between the United States and Mexico. They are also much in use in Europe.

A. J., Peoria, Illinois, and C. F. H., Ashland, Wisconsin.—Personal application at the office of the division superintendent or master mechanic is the best method of obtaining employment as an electric motorman. A probationary period in some capacity is a usual prerequisite to appointment, during which time special instructions are given to those who may be in line for advancement. It may be added that in matters of this kind all railroads have rules and regulations of their own which could not be categorically classified in these pages.

V. P., Kingsville, Missouri.—The Chicago and Alton has recently received ten new Mikado locomotives, which are heavier than any of the other engines on the road to which you refer.

(2) The new Union Station at Kansas City has been built with a view to accommodate the trains on all roads running into Kansas City.

(3) Camel-back locomotives are those having the cab set forward of the fire-box. This is rendered necessary on account of the fire-box extending over the frames and precluding the possibility of allowing room for the reverse-lever and other attachments.

W. J. A.—The Prairie, Consolidation, and Mikado types of locomotives are all used on the Lake Shore and Michigan Southern Railroad. The Twentieth Century Limited passes over this line, which is now part of the New York Central lines.

E. J. M., Chicago.—Putting an engine in white lead refers to the practise of covering the polished parts of the mechanism with a thin coating of white lead to prevent oxidization or rusting. This is frequently done in the case of new engines or engines newly repaired that do not go immediately into service.

(2) "Doubling" is using two locomotives on one train.

(3) "Side-swiping" is the word applied to a collision when one train has moved into a siding to allow another train to pass, and the rear car or more may not be sufficiently far from the main track, so that the second train strikes, or side-swipes, the first train.

(4) "Straight-air" expresses the simpler forms of air-brake appliances which were in use previous to the adoption of triple-valves and auxiliary reservoir.

(5) The difference between what is known as run of mine oval and screening is as follows: The first is the coal that is taken out of the mine and without special cleaning or screening is used for firing. Screenings are the smaller pieces of coal that fall through the screens over which the coal is passed while in the process of being broken or cracked into various sizes.

A. C. S., North Charlotte, North Carolina.—There is no train that passes from coast to coast with only one stop; that is, if you mean the Atlantic and Pacific coasts of North America. There are many stoppages and many changes of engines. Trips on first class trains are made from New York to San Francisco in 4 days 2 hours and 26 minutes. This is the fastest scheduled time; the average is five or six hours more.

L. J. K., Pen Argyl, Pennsylvania.—There are no railroads employing firemen and engineers without first testing their eyesight. Letters of the alphabet of different sizes are always used, also colored skeins of wool. Each eye is tested separately, as many instances occur where one eye is defective.

J. K. WOOLEY.—Books on standard train rules and train-despatching may be obtained from the Angus Sinclair Publishing Company, 114 Liberty Street, New York City, New York.

R. M., Lincoln, Nebraska.—There are several trench excavators capable of cutting a trench from 2½ to 6 feet wide and 18 or 20 feet deep.

F. R. T., Eldorado, Kansas.—There is no fixed rule in regard to the handling of a locomotive running in a snow-storm or after the snow has collected to the depth of several feet on portions of the track. An entirely different situation confronts the engineer who is running an engine hauling a passenger-train and one with a single locomotive who is trying to clear the track with a snow-plow.

In the latter case a high speed is attained before reaching the accumulated snow. In the former case it is safety first. The obstruction must be approached cautiously. It is safe to assume that an experienced engineer knows what is best to do in the condition immediately confronting him. A trip across the Kansas plains in a snow storm will teach a railroad student more in regard to this matter than he will find in books.

IF a train is running 60 miles an hour, and a fly walks from the rear end of a coach 40 feet long to the front end while the coach is running 60 miles an hour, how fast is the fly traveling?—G. B., Kinder, Louisiana.

The fly is walking at the rate of 40 feet per hour, and is moving through space 60 miles and 40 feet per hour.

C. C. F., Louisville, Kentucky.—Address communications in regard to wireless operations to the Marconi Wireless Telegraph Company of America, 27 William Street, New York City, New York.

T. V. M., Moline, Illinois.—It would be impossible in our limited space to describe in detail the number and variety of locomotives that you refer to. Such extended descriptions do not properly come within the scope of "The Light of the Lantern."

D. H. H., Proctor, Vermont.—The small wheel, or trailer, placed behind the driving-wheels of the Pacific type locomotive admits of a large increase in the size of the boiler. The assumption that an obstruction placed in front of this wheel would have a tendency, when the wheel passed over the obstruction, to raise the engine and drivers from the rails is incorrect. The springs and equalizers would prevent any such contingency, unless the obstruction was of an extraordinary size.

The turning of wheel tires is not regulated by any particular period of service. It is a matter that depends on the amount of wear shown on the tire.

READER.—No individual is credited with the original invention of the block signal. The simplest method of maintaining a space interval between trains, designated by the American Railway Association as "the telegraph block system," was first used to any extent between New York and Philadelphia on what is now the Pennsylvania Railroad.

The Pennsylvania Railroad at the Chicago World's Fair, 1893, exhibited a "Pole and Ball Signal" used on the Newcastle and Frenchtown Railroad in 1832, and designated it the commencement of block signaling in this country. This road was 20 miles long, and the signals appear to have been used for conveying information from one end of the line to the other rather than for a block.

The following information obtained from a letter written by Mr. A. Feldpauche, principal assistant engineer of the P. W. and B. Railway, may be of interest.

"When the train was just starting from Newcastle, the man in charge at that point raised the ball to the top of the pole. The man at the next station, seeing the white ball raised by the first man, raised his ball to half the height of his pole. The men at the other stations, each on the lookout with his telescope, which was placed in the guides provided for the purpose on the side of the pole, also raised their balls to half mast, thus conveying the information throughout the line that the train had started.

"When the train reached the first station the man would immediately raise his ball to the top of the pole, as a signal, both ways, that the train had reached him, lowering his ball when the train reached the next man ahead; this being repeated successively at each of the four stations.

"When a train, having passed one station, did not arrive at the next, or was seen to be in trouble in any way, the man at the station next nearer Newcastle would lower his white ball and substitute a black ball kept at hand for the purpose. The black ball would raise it to the top of his pole as a signal to be successively transmitted to Newcastle, and a relief train would be despatched to the assistance of the regular train."

A. S., North Yakima, Washington.—A shot fired on a moving train has the same effect exactly as if fired on the ground. In regard to jumping off a train while it is running at a speed of sixty miles an hour, one would not alight on the ground immediately at the spot beneath the point at which his body left the train. The momentum acquired by the motion of the train would impel the body forward in the direction in which the train was running. The line described by the body would be that of a parabolic curve.

A. P. R., Nome, Alaska.—The railroad mileage of the Latin-American republics is as follows:

Argentina, 20,314; Mexico, 16,104; Brazil, 14,000; Chile, 5,001; Cuba, 2,195; Peru, 1,700; Uruguay, 1,560; Bolivia, 750; Colombia, 645; Venezuela, 545; Guatemala, 450; Costa Rica, 430; Ecuador, 365; Paraguay, 235; Dominican Republic, 225; Panama, 202; Nicaragua, 194; Salvador, 122; Honduras, 106; Haiti, 94.

Two-Gun Kid's Big Play.

BY EDWARD T. GLYNN.

Though He Couldn't Use His Royal Straight Flush, He Drew a Better Hand and Beat the Deck.

AT full gallop Sheriff Job Keeler's pinto plunged into a hidden hole and snapped a leg. Job pulled himself together, mercifully ended its agony with a .44, and, nursing two lame knees, sauntered into Rapid City late in the afternoon. Babe Dalghren, horse thief, had crossed the Texas border into Mexico about four hours before.

Half an hour later he emerged from the sanctum of the town marshal, who, with true professional hospitality, had first offered him a large-sized drink and then, in equal measure, brotherly consolation. The sheriff, guided by the marshal's recommendations, turned both his thoughts and his steps toward the ever-open doors of the Punchers' Rest.

There, had he been apprised, one might find diversions enough to while away all the money and time with which one might be encumbered. Having a little of each, the sheriff, walking along, inwardly proposed to properly spend both in pursuit of poker, a popular pastime to which he was as partial as he was proficient.

At his destination the sheriff, with a commendable consideration for a still insatiated thirst incurred in his recently enforced march across ten miles of Texan desert, paused first at the bar.

Having been promptly recognized for whom and what he was and properly served from a bottle separately shelved for the private use of privileged persons, the sheriff raised his glass, turned slowly about, and glanced casually into the low-ceiled, smoke-hung gambling-room farther down the line. With the glass at his lips, he suddenly lowered it to the bar.

Through the undulating rifts of tobacco smoke the sheriff had recognized in one of the six men about a card-table in the adjoining room, a man for whose apprehension, dead or alive, the State was offering a five-hundred-dollar reward. The man was "Yuma Bill," *alias* the "Two-Gun Kid."

The sheriff's smile had changed to one of gloating triumph a moment later as he again raised his glass and downed its contents with appreciative gusto. With eyes still focused on his man, he placed the emptied glass back upon the bar and leisurely sauntered forward. As he passed down the line of men ranged along the counter he unostentatiously unholstered the two big .44s draped at his hips.

The Kid, with a luck that had characterized his play all afternoon, had just drawn a missing ace, filling a royal straight flush, when both batteries of the sheriff's light artillery suddenly encamped on opposite sides of his neck.

As one suddenly galvanized into life, the Kid unwound his elongated legs from beneath the rungs of his chair and started to his feet. At the ominous click which sounded in his ears as the sheriff simultaneously cocked both weapons he wisely, but profanely, subsided.

The others at the table gathered up their cards, relaxed themselves into attitudes of comfort, and awaited further developments with a mild curiosity which

clearly indicated that such an interruption was not without precedent. With one quick, hopeless glance around this circle of neutral countenances the Kid, arms discreetly raised, turned slowly in his chair

Recognizing his captor, a sullenly submissive smile appeared upon his lips and he broke the prevailing silence. As he spoke he exposed to the sheriff's scrutiny the cards concealed in an upraised hand

"Y'll wait a jiffy, sheriff, till I've cleaned up house with this?" he entreated coolly

Then ensued another momentary silence while the sheriff, obviously taken aback by this unexpected request, allowed appreciative eyes to rest on the Kid's cards. Lowering his gaze toward a pair of guns holstered at the other's hips, the sheriff shook his head.

"Nope, son; I reckon I'll call that hand of yourn right now," he said shortly. "Come—get up."

Something in this brusk command brooked no trifling. The Kid muttered an oath, tossed his royal straight flush back upon the table, and sullenly arose. Arms still raised, his back turned toward the sheriff, he stood as rigid as a statue, while the officer, smiling satisfaction, disarmed him with a proficiency acquired of long practise.

Ingloriously shorn of his arsenal the Kid, smarting under the scrutiny of an anticipative audience, wheeled himself about in prompt obeyance and deferentially donned a pair of handcuffs

The crowd, to whom this complete capitulation was most amazing, in view of the Kid's vaunted reputation as a fearless gunman, dispersed in manifest disgust. Within a half-minute both the Kid and the sheriff had ceased to attract the fickle patrons of the Punchers' Rest. Their departure from the place was practically unnoticed.

The town marshal, absorbed in the contemplation of a purpling horizon, was seated on the rear steps of the unpretentious shack that served him jointly as an office and jail when the sheriff marched the Kid into his presence. He deferentially arose at his superior's approach. Briefly apprised of whom and what the Kid really was, he bestirred himself sufficiently to evince surprise, if not envy, that the sheriff should find such lucrative gleanings in such a two-cent town

Five minutes later he had satisfactorily arranged for the temporary incarceration of his captive in the one cell of which the local calaboose boasted, and the sheriff retraced his steps toward the beckoning doors of the Punchers' Rest.

As he walked along his grouch of the earlier day vanished. He thought of the many little ways in which the sum of five hundred dollars could best be used to the mutual benefit of those concerned in a certain cabin home some fifty miles away. The sheriff was a good and generous husband. It was only natural that in matters monetary he considered the wishes of his wife.

Though it was a happy and contented sheriff who entered the Punchers' Rest, it was a happier one who, two hours later, reluctantly emerged. The sheriff had readily relieved the poker-playing portion of Rapid City's population not only of their prestige, but of most of their currency as well, an amount aggregating three hundred dollars.

The town marshal, fondling a .44 in either hand, was maintaining a vigilant guard over his prisoner when the sheriff reentered his presence.

The few formalities of the occasion being quickly observed, the sheriff and the Kid passed out into the gathering dusk. With their departure the marshal, turning back from the open doorway, affixed an appreciative gaze on a fifty dollar bill which the sheriff, in a magnanimous moment, had just bestowed upon him.

The luck in which he had reveled favored the sheriff on his arrival at the apologetic affair which Rapid City called a railroad station. The train upon which he purposed to take his captive back to the county-seat established a precedent by arriving on time

The sheriff, marshaling the Kid before him, entered the smoker, selected a seat near one of the doors, and placed his captive, still handcuffed, next the window. Without attempting to break down the barrier of silence, the sheriff, seating himself, leaned forward and divided his attention between his prisoner and a poker game in progress just ahead

Four men were engaged in the game. Two, evidently ranchers returning, money-laden, from the market, were losing with a consistency which, at first, aroused the sheriff's suspicions. He soon assured himself that the ranchers were merely the victims of their own poor playing, and his suspicion was succeeded by contempt.

When he saw one of the ranchers throw aside an ace and a king and retain three low cards of different suits his sensibilities became outraged to such an extent that he settled back in his seat with an audible grunt of disgust.

The Kid, joint witness of the play, turned a grinning face toward the sheriff and oathed a commentary.

"Sheriff," he drawled, "but that ain't even train-robbin'. That's plumb stealin' from the blind."

A grin slowly spread itself across the sheriff's lips.

"Yuma, it's even worse'n that," he deigned. "Playin' them gents, Yuma, must feel like robbin' the dead."

The sheriff, for want of other diversion, then settled himself farther back into his seat and resigned himself to pleasant thoughts born of his prosperity. Of a sudden he became vaguely aware that some one was eying him closely.

He glanced up to behold both ranchers smiling at him over the back of their seat. Their recent partners had just disembarked at a desert station, from which the train was now slowly receding. At once the sheriff read the mute invitation in their eyes.

"You an' y'r friend care to sit in, pard?" asked one of the men.

The sheriff's face lit up with a gloating smile. In his present opulence the lust for greater wealth was upon him. The next moment his smile became a wry grimace.

"Like t' pards," he answered, "but I can't. I got a valuable bird here an' I can't take chances of his flyin' off."

With the words scarcely out of his mouth, the sheriff regretted them. The smiles of the ranchmen bespoke as plainly as words their opinion of an armed officer who deemed it desirable to keep an unarmed prisoner "ironed up" on a train making forty odd miles an hour. Their expressions of amusement and contempt at once bestirred the sheriff's resentment. With a smile he turned toward the taciturn Kid.

"All right, pards," he averred, in tones of sudden finality, "we'll sit in."

He produced a bunch of keys and proceeded to liberate his captive's hands. As he did, he addressed the Kid quietly:

"Yuma, I got to allow that was a raw deal o' mine—callin' that pat hand of yourn back there," he said. "I reckon I can't square it up no better'n by turnin' yuh loose on them card-fiends ahead. 'Sides, this'll be y'r last game for a long spell, son."

He straightened up, and thrust the manacles into his pocket.

"Get round there now," he added, "an' we'll hit 'em like a panic."

A moment or two later, when they were comfortable in their new seat, the Kid next the window, the sheriff at the aisle, the sheriff laid a .44 on the narrow table before them.

"Now, then, Yuma," he cautioned, "don't come no tricks that ain't accordin' to Hoyle. This here gun o' mine beats everything 'cept what's dealt off'n the pack. Sabe?"

The Kid nodded and delved into a pocket for a recently accumulated roll of bills. The sheriff then produced his own wad, one of the ranchers handed him a pack of cards, and the game began.

Within the lapse of the next half-hour the sheriff had enriched himself to the extent of another hundred dollars. Meantime his opinion of the two monied ranchers had changed. Instead of contempt he now fostered an admiration for their gameness.

They were cheerful losers, and that was at least a redeeming quality. There was no pity in his admiration, because the sheriff was not built that way. To the contrary, he gladly noted that most of what he wasn't winning was being won by his charge.

The Kid had just finished a deal, and the four men were absorbed in the contemplation of their respective hands when, with startling suddenness, the doors at both ends of the coach flew open and then slammed shut. From either end of the car came the command:

"Hands up!"

With a muttered imprecation the sheriff hurled his cards across the table and clasped a hand on the .44 at his

elbow. In the silence pervading the coach he noted, for the first time, that the train was rumbling to a stop.

As a full realization of what was occurring flashed through his mind he swept a hasty glance up and down the car, noticing the bristling guns of the two masked intruders and the pallid faces of his cowered companions.

Suddenly conscious of what resistance might mean, he released his grip on the .44 and raised his hands. Something in the smile with which the Kid viewed his act thrilled his heart with a new suspicion

He was watching the nearest bandit collect the contributions of docile doners under the protective pistols of his colleague at the opposite end of the car when a sudden movement on the part of the Kid shocked him into action.

Without heed to the bellowed oath of the near-by bandit he snatched the weapon from the table and flashed its muzzle into the Kid's lowered face. The bandit, comprehending nothing but his own seeming danger, dropped a hatful of spoils and swept a pair of Colts into aim. With murderous intent he fired both weapons at once.

One of the bullets sped between the sheriff and his charge, biting its way into the woodwork beyond. The other creased the officer's right wrist, releasing a little geyser of blood. With a groan the sheriff, dropping his gun, reeled back against the seat. The .44 clanked upon the table.

His blood froze for a moment as he glimpsed the Kid lunging for the fallen weapon. He closed his eyes in mortal terror when the Kid, cursing volubly, sprang up, gun leveled. With a little shudder he heard the crash of the .44 close to his ear and felt the weight of a body crowding past his own.

A moment later, aroused by the mingled oaths and shouts, he opened his eyes and beheld the Kid standing in the aisle, waging unquartering battle with the nearest outlaw.

Still struggling to clear his thoughts, he dimly saw the Kid go down before the merciless fire of the bandit's guns. Next moment he oathed his admiration as the Kid, lying prostrate in a pool of spreading crimson, gamely raised his hot, smoking weapon and emptied the last of its deadly contents into the other's breast.

The sheriff faced about to behold the two ranchers standing up on their seat, spraying the farther end of the coach with bullets. They had taken advantage of an unexpected opportunity to rout the second outlaw.

Followed a momentary lull then amid a babble of voices the passengers piled into the aisle. A doctor, bag in hand, stepped forward and hastily examined the mutilated men on the floor. The Kid, though alive, was beyond mortal aid. The outlaw was dead.

In silence the ranchmen gathered up the Kid's tortured body and gently placed him in a near-by seat.

"Did—did I fetch him?" he asked weakly

"Yuh did —for keeps," gently answered one of the ranchers.

He waited for a moment as he noted the satisfied smile that stole across the Kid's pallid lips, then, his tones softened by a new note of sympathy, he said:

"Pard, I want to thank you for this for the crowd. It ain't much, pard, but it's all we can do."

He held out his hand.

"Here, pard, afore you go. Shake—we owe you a hand at least."

With glazed eyes the Kid glanced from the hand into the speaker's face As he did his smile changed to withering scorn

"You do?" he asked slowly. "D' yuh think I did that for youse—youse?"

In the silence the group exchanged wondering looks. With a ghastly expression on his face, the Kid tried to rise.

"Git—git y'r hands up," he gurgled "Oh, God —I'm—done."

The sheriff arose from beside the dead bandit in the aisle and faced the awed passengers.

"Pards, listen here," he said. "I've just savvied this thing out. See that cuss there—on the floor? That's Yaqui Pete—the Desert Pest. Him an' the lad on the seat there was pals—once. That was two years ago. Then they rowed—a gal. Later Pete here did a squeal an' the kid there got ten years. He escaped last week. I was luggin' him back He'd sworn he'd get Pete, an'—well, I reckon he has."

Observations of a Country Station-Agent.

BY J. E. SMITH.

No. 62.—Some of the Troubles that Side-Track a Ticket Man when He Is Doing His Best to Get Passengers Safely on the Main Line.

VER at the freight office a man who ships a barrel of cabbage is very particular that the agent gives him a bill of lading for it. At the express counter he makes sure when he ships a box of spare ribs and home sausage that the agent gives him the necessary receipt.

Two weeks later, when the cabbage has gone astray or the box has loitered along the way and missed its connection, the shipper comes back to the office with his complaint and asks for another bill of lading or express receipt.

The point I make is that while a transportation company must always issue a receipt, the incidental and chance shipper will always lose it and come back after another.

Every man whose office file and index system is his coat or pantaloon pocket can be counted on to a dead certainty to lose any paper given him and the transportation man may always count on duplicating it if the paper should be required later.

It affords the office force great pleasure to do this. He knows that when John Doe is so particular to have his receipt that he cannot find it three days hence to save his soul. The office man may suggest that it be left in the office, where it can be had in event of need, but John will insist in having it in his own possession—crumpled up in his pocket along with the "statement of account" from the butcher, and soon beyond recall.

Now the man who sells tickets has the same sort of trouble, only in a different way. He often finds it necessary to duplicate much of the information he supplies.

In many instances when he goes to great pains to detail routes and connections for a prospective passenger, he counts it pretty certain the passenger will forget it all or tangle it up in hopeless confusion within a day or so after leaving the ticket window.

It occurs to you that the ticket man might write it all out on paper in such cases.

If he does, the paper is lost forthwith, and he is called up on the phone and asked to dig it all up again, whereupon there is nothing for the ticket man to do but stifle a snarl, suppress his vexation, lubricate his words, and proceed to duplicate all his previous specifications.

In this connection he has other types of passengers—those who have never learned to listen, and those who have no mental concentration to absorb what is outlined and explained to them.

Example:

A talkative woman appears at the ticket window.

Series began in the July, 1907, Railroad Man's Magazine. Back numbers for sale at this office.

"Do you know," briskly exclaims the woman to the ticket man, "I was just wondering how it could be done. You see, I want to go to Mattawamkeag, Maine, and start from Indianapolis, you know. I want to stop off at Asheville, North Carolina, and then—"

"But, madam, that is—"

"Yes, I know it is not exactly on the regular line, but it would be a great accommodation to me if I could stop off at Asheville, North Carolina."

"But you said Mattawamkeag, Maine."

"To be sure, that is my final destination; but I want to stay a few days at Asheville, first. Then I would like to go from there to Sault Ste. Marie, and then to Montreal, and from there to Mattawamkeag "

"We could not possibly "

"Oh, you could if you would I am quite sure you could. If there was anything unreasonable about it I would not expect you to. People do not always have to go in a straight line when they travel I know they do not. My brother-in-law went to New York by way of Washington last month. Asheville is only a little south of Washington, and Sault Ste. Marie is only a little way north "

"It could not be done—"

"This is my first journey East. I want to see all I can. If it's just impossible to go by way of Asheville and Sault Ste. Marie, couldn't you get me there by Washington, D. C., and Toronto, Canada? That would be better than to go straight "

"Really, madam, it is—"

"I do want to see Niagara Falls so dreadfully bad, and I want to spend a few days at Atlantic City. What train will I have to take to go through Newport in the afternoon? If Mrs. Skads knew I was passing through Newport she would be down to the train to see me. How long does the train stop at Newport?"

"I am not "

"Oh, well, it does not matter in particular. If I can get to the Adirondacks I would proceed on through the White Mountains. That would be a glorious trip, would it not?"

"There is no possible—"

"Or you could make the ticket read by boat from Montreal through the Thousand Islands—"

"Madam, we have no—"

"But you see I want to avoid New York City if I can. A woman traveling alone should not take any chances. I could get a Pullman all the way through, whatever way I go, could I not?"

"Pullman cars are—"

"I wouldn't have to occupy a berth all day, would I?"

"Only—"

"That would be asking too much, to expect a passenger to stay in bed all the time. I would want to see the scenery during daytime. I am quite crazy to see the Horse Shoe Bend. My uncle has seen it. He says it is perfectly grand—"

"You are not compelled—"

"I've always wanted to see Johnstown, where the flood was. Does the train go through there in the daytime?"

"I think—"

"It would be a great disappointment to me to go through all these places after night, when I have been at such great pains to get posted, so I will not miss anything."

"I think—"

"Goodness me! I want to catch that next street car. I want to thank you for all the information you have given me. There's so many things one must learn before starting out on a journey. Good-by!"

She was gone.

The ticket man wiped his brow, drew a long breath, and lighted a cigar.

*

IN a few moments the telephone bell rang.

"This is me," spun a thin, shrill voice. "Do you know, I forget how much you said a ticket was worth to Mattawamkeag, Maine? And I forgot what you said about taking a steamboat down the Hudson River from Albany. I am afraid to go through the Hoosac Tunnel.

"I understand people choke up with gases when they go through tunnels. Maybe it would be best, after all, to go by way of Martin's Ferry and the Shenandoah Valley. I thought after I came away from your office what sights of historic interest I would miss if I did not go through Gettysburg.

"Is it good form to tip the porter every time he does something for you, or just one time on the trip? Does one tip the conductor, too? Do you distribute guide-books with the tickets, to tell passengers all about everything?

"You do not know of any one else going to Mattawamkeag, do you? I never traveled alone. You think a lady would be perfectly safe, don't you? It makes me nervous to think about it. I want to thank you for what you have told me. You have been so patient to explain everything. I may have to bother you again before I get all my arrangements made. Good-by."

She rang off.

"Quite welcome, madam," grinned the ticket man after he hung up the receiver. "Any one who can tell you anything will have to have either chloroform or a bugle—"

The telephone interrupted.

"Do you know, I wasn't quite done. I'm ashamed to acknowledge it, but I plumb forgot what you said was the price of that ticket. I think I am getting more forgetful every day. Aunty tells me I am. She says I will have to carry a pencil and a pad, and put everything down if I want to have it afterward. Aunty is always joking about everything. She is seventy-eight next spring, and is as spry as I am. If I can keep my senses as she does, I would not mind growing old."

"The fare first-class is—"

"Oh, dear me! That's another thing I wanted to tell you. I want first-class. Wouldn't it have been humiliating to have gotten on the train without saying anything, and found I was second-class? Wouldn't that have been a shock? My heart action is not good, anyway."

"I would not have sold you sec—"

"Of course not. You know a lady of refinement when you see one. To be sure you do. Oh, yes! Now I remember. What I wanted to ask you was, had I better take the nine o'clock train or the three o'clock train? Will I have to change cars at Bradford? Will I have to change at night? There was something else. It makes me so nervous to think of traveling all by myself—but there was another thing "

"You don't -"

"Well, that's a relief, I assure you. There is a diner on the train? I am ashamed to say it, but I never dined in a diner. Are the menus printed in French? I would be so mortified not to be able to tell a waiter right off what to bring me—"

"They are print—"

"Now I have it. I remember now what I was going to ask you. Can't you get me a menu card in advance, so I can study it out, and be prepared, and there will not be any embarrassment?"

"But they—"

"I suppose it is good form to tip the waiter, too? I suppose he would give me more attention if I let him know I appreciate what he does for me. When one passes a tip does one hold the coin up and drop it into his palm, or does one lay it on the tray?"

"He'll get it any old way—"

"And — oh, my goodness, I forgot! There's my luggage and traps. Mrs. Wadd told me those were the words to use. Doesn't a steamer trunk appear more classy than a common trunk? Mrs. Wadd is going to lend me her steamer trunk, because it has eighteen foreign labels pasted on it. She has traveled all through Europe, and she has explained a great deal to me. You notice I have ideas?"

"It is beginning to percola "

"When one knows just what one wants, it makes everything so much easier—"

"When do—"

"Of course, I hadn't told you that. The exact date is not fixed. Maybe next August or September. That is four -no, three months yet. No! Oh, dear! I always get so confused when I attempt to figure anything. I think most women are that way—"

"There may be—"

"That is true. A great many things may happen before then that may change my plans. But a lone woman about to set out on a journey should have all the information she can get, so she will get through in the best way and make a good impression."

"Glad to—"

"I want to thank you again for your advice and information. You have been very kind. I wonder if I have forgotten anything. I'm so rattled."

At this point the conversation came to

an end. The connection was broken — but only temporarily.

There came a long and vigorous ring, like a clarion call to duty.

"Hello! Hello! This the ticket office?" It was the same voice. "I declare, they cut us off. That impudent Central hussy! I gave her some of my mind! Aunt says I should stop at Boston, by all means, and visit Bunker Hill, and go out and sit for a few quiet moments on Plymouth Rock—"

"Say, your aunt's a peach!"

"Sir?"

"I say, that's the arti—"

"Some rude person is breaking in. I declare this telephone service is getting worse all the time. It is almost impossible to have an uninterrupted conversation any more. Here are some more things I want to ask you "

"Wait! Wait a moment, madam, please. This is the office, but not the ticket man. Something dreadful has happened to him." His voice grew solemn and sepulchral. "He's having a fit. Maybe it's apoplexy!"

"Oh, dear! Dear! Dear! Let me call aunty. She will tell you just what to do. Aunty! Aunty!"

Whereupon, the ticket man, with no inclination to be rude, removed himself from the phone and put the instrument out of commission by forgetting to hang up the receiver.

Then he got out the general passenger agent's latest circular on "Courtesy," and squinted long and hard at the paragraph headed "Patience."

HERE is one about an old man bound for California, instead of Maine. It was the first time he had ever been out of his township. He was going to California because he had to go, and not for any love of travel or sentimental reason.

When he found he could pass through the State of Kansas he evinced signs of interest, and asked that his ticket be made out so he could stop off at Hill Top. The ticket man located Hill Top on a north and south road, and the best he could do for the old man was to route him through Emporia or Toronto, where he could make a short side trip to the village of Hill Top. The ticket man explained to him how it could be done. There would be an additional cost of one dollar and a half for the side trip.

"I have a brother at Hill Top, Kansas," explained the old man. "I haven't seen him for thirty years. He run away from home when he was a youngster, because him and daddy fell out.

"He never writ back but once or twice. Me and him slept together in the same bed, and worked together until he was eighteen and I was twenty, when he run off.

"They was never enything mean about Hen—only just a little stubborn. He didn't say nothin'. He just up and dug out. He writ me onct that if he found enything that was good he would let me know, and I could come out where he was.

"I reckon it was two years, maybe three, when I got a postal card from him. All it said was 'Come on.'

"It didn't have nary date or name of any place on it, and it had been mailed on the train, and there wasn't any post-mark to go by.

"None of us could make out where it was from, so I couldn't answer it, and I couldn't go, so I stayed in old Indiana.

"I didn't hear from Hen any more for ten years. A man from Kansas who knowed him came to our house and told us all about him. I always thought a powerful lot of Hen. They never was a better hand on the farm than Hen. And dad said so himself after Hen was gone. Dad was a little to blame."

"I did not care for all the family history," said the ticket man when he told me the story, "so I tried to short-cut further details by hastening along with the explanation that fit the case as it related to the stop-off at the small expense of one fifty. Then we deadlocked.

"He wanted the ticket to include the stop-off at Hill Top at no additional expense. He knew the value of *E Pluribus Unum* from the wheat heads on Miss Liberty's crown to the last arrow-point in the claw of the eagle."

"I think," said the old man, "that we ain't done right, neither Hen or me. It's been thirty years since I saw him, and ten years since I have heard from him. It ain't right. Your own kin is all they is in this world that cares for you, ain't that so?"

The ticket man noded a solemn concurrence.

"If Hen would die and I'd never get to see him any more, I'd feel almighty bad. Yes, sir, I would. Seems to me when you look at it that way and then remember I ain't seen Hen for thirty years, the railroad would make the ticket read to stop off at Hill Top."

The ticket man told him there was no way to do it. He could get him off at Emporia all right, but running down to Hill Top was his own affair and an extra expense of a dollar and a half.

"But I haven't seen Hen for thirty years," he expostulated

"It will cost you only a little more than a dollar to run down and turn the trick," said the ticket man

"And you won't put it in the ticket?"

"It can't be done."

"Wouldn't Hen be surprised! Me walking in on him! What do you reckon he'd say? How do you think he would act? It would be the biggest surprise to him he ever had! When you think of it that way, can't you fix it up in the ticket, you reckon?"

"It will cost you a dollar and a half extra," was all the ticket man could say.

"Hen would never be thinkin' of me. He'd be thunderstruck. I'll bet he couldn't say a word. I'd go in on him like I wanted to stay all night, and see if he'd guess me. Then I'd ask him where was he from. Then I'll be surprised. I'll know people he knows, and pretty soon he'll guess it. Now, what do you say? Will you make it through Hill Top at the same price?"

It was a great temptation for the ticket man. A meeting of two tightwad brothers after thirty years' separation has its pathetic appeal, even to the hardest-hearted ticket man. Fancy old Hen in pop-eyed amazement, then stricken dumb, full recognition, and tableau!

"It can't be done!" replied the ticket man firmly. "The side trip from Emporia down to Hill Top and back will be additional. But it ought not cost you more than one fifty."

"I'd like powerful well to see Hen. Maybe it would be worth it; but if you can't make the ticket read that way without costing any more, I'll not do it this time. You may make it out by way of Omaha. I can see the Omaha stockyards, can't I?"

The ticket man threw in the stockyards. He went by way of Omaha. He passed brother Hen something like one hundred miles to the north. He could have gotten within twenty miles by way of Kansas City and Emporia, but it takes strong family ties and a sturdy family affection to make a frugal man surrender one dollar and fifty cents in good money for the joy of meeting and greeting a brother with whom he slept in the same bed thirty years before.

Why should we see anything ludicrous in the determination of an old man who would not cash in on his emotions for a long-lost brother, to the extent of one fifty? It is to laugh.

WHY do we laugh, anyway?

Here are two minor incidents that happened at our station recently. They are almost identical. One created sympathy, the other merriment. Why?

A rather thin man assisted some of his people on the train last Monday afternoon. He lingered in the car over the parting ceremonies a little longer than he should.

People always do that when parting. There are always caresses and advice to be crowded into the flurry of the last minute. These demonstrations of affection and solicitude usually result in blockading an aisle or the entrance, and are not in high favor with passenger conductors.

Anyway, this man I am telling about lingered an instant longer than he should while his wife gave the final caution about his muffler and his woolens.

The train was in motion when he reached the car-steps to get off.

He alighted, facing the right direction, but with both feet on the pavement at the same time. In getting off a moving train, understand, you light only on one foot.

Of course, one learns all about those things when he is around trains much, but the general public does not. The man fell. It did not hurt him much. A little cuticle was scraped off the palm of his hand and off the top of his nose.

Nobody laughed. People ran to assist him and express their sorrow.

The next day the performance was repeated

Instead of a lean man, the victim this time was fat. He weighed at least two hundred and fifty pounds.

He assisted some people on the train, and he could not get off until the train was in motion.

In the momentary excitement he jumped straight out, at right angle—get that?—and with his back toward the direction the train was moving.

He sat down with an awful thud, and everybody roared. It looked funny to me, but, being a ticket agent, I maintain a face set dead against all human frivolity.

Now, this is the question before this august body: Why did the slim man who fell forward receive the help and the sympathy of those about him, while the fat man, who went over backward, received only gibes and jeers and hoots of merriment?

The incidents were the same. Why was one distressing and the other funny?

It is all too deep for me. The fat fellow was jolted harder than the lean one, and he listed heavily to port as he walked off.

Why did the rabble laugh at him? Why did they scringe when the lean one went over? What is funny about that old man whose full stock of emotion was not worth one dollar and fifty cents?

*

A LADY passenger, accompanied by two children, one of whom was a half-head taller than the other, appeared at the window.

"A whole and a half fare ticket to Mill Grove," said the woman.

"How old is the little girl?" asked the ticket man, pointing to the taller child.

"Ten next birthday. She is large for her age."

She got her tickets, paid for them, and continued to talk, which is the heaven-born prerogative of womankind everywhere.

"Bina grows very fast. She will soon be a young lady. Little Vina does not grow at all. She will always be small, like her father. How much difference do you think there is in their ages?"

The ticket man gave a squint and made an offhand guess of four or five years. The woman seemed pleased.

"That is what every one says," she added. "You would be surprised to know they are twins. No one ever guesses it, but they are."

The train came in, and the woman departed. Then the ticket man suddenly woke up. He talked unto himself out loud and as follows:

"Why, hang it all, I ought to have made that woman buy two half-fare tickets. She said they were twins. That makes them the same age don't it? Sure it does. We charge according to age, see? Oughtn't one twin pay the same as another? I'm too slow for this job.

"Do you know what I will do when I get to run the passenger department? I'll change the whole system of fares. I'll charge 'em by the weight. A four-hundred pound man and a ninety-pound woman will pay accordingly. There will not be any question about a kid's age. They will pay by weight from forty pounds up!

"I wish that woman had not told me they were twins. It reflects on my work, that I made one twin pay half fare and let the other go free!"

NEW WESTERN FREIGHT FLIER.

THE Rock Island has established a through California fast schedule freight service which is said to be the first established by any road between the East and the Pacific coast. This train is designed to carry all high-class freight of less than car-load lots. It is known as the "Golden Ball." It will make scheduled time between Chicago and the coast. Traffic from Chicago, St. Louis, and intermediate points will be assembled at Kansas City and from Kansas City to San Francisco and Los Angeles none but California cars will be accepted. As many sections of the train as needed will run to take care of the traffic. The running time between Chicago and California and intermediate points has not been definitely determined Test runs are being made to decide that point. One feature of the service will be the train movement information that the road will give to shippers at all times

When Kemp Passed Out.

BY WALTON BURROUGHS.

Old Coogan Tells the "That Reminds Me Club" Of an Engineer Who Acted as Executioner.

AS the peremptory sound of the clattering gong, energetically kicked by the foot of the driver, clanged its insistent warning on the still evening air, a hush and a look of expectancy passed over the two night switching crews loafing on the siding in front of the yardmaster's office.

Save for the drowsy sound of softly purring steam, the switchers were now peaceful and quiet enough, but, like crouching tigers awaiting their prey, were only patiently waiting to pounce viciously, with snort, jerk and bang, and juggle their next victim—a fast freight reported from the West.

As the ambulance backed up the crews arose and strolled toward it as Jeff Foster, yardmaster, proffered the information:

"It's on 42 always take 'em off here if they toss 'em this side of Sanford hate to have passengers see 'em unloaded up to the station."

As he finished speaking, 42, the fast mail, poked her headlight over the hill, then drifted down to the yards, without the customary peevish screech for the block, and came to a stop. The door of the baggage-car slid back with a rattle, and many hands gently laid the limp, torn bundle on the stretcher, and at the conductor's upraised finger, the fireman pulled his outstretched body in the cab window, and 42 slowly crept away to the station

The switching crews silently straggled back to the deeper shadows cast by their engines, and dropped down on footboard or tie-ends and resumed their interrupted wait, each wrapped in his own thoughts.

Coogan, engineer of No. 120, oldest and most talkative member of the That Reminds Me Club, turned with hands deeply thrust into overalls pockets, and a reminiscent look on his good-natured old face. Slowly knocking the ashes from his corncob pipe and drawing the back of the broad hand over his mouth, he drawled, with a sigh:

"Though, Lord knows, I've seen plenty of it, them sort of things, somehow, always strike me where the hide is thin. Now, seein' that poor soul comin' in in that shape, reminds me of a time I saw two of 'em unloaded right at that same identical spot. One of them was chewed up as bad as that one, and the other was the eagle-eye himself that had struck him, and I got mighty good cause to recollect it, all right."

The rest, as one man, gathered closer around Coogan. The shaking out of his pipe, followed by the motion of drawing his hand across his lips, were unmistakable indications he was going to run on some branch line where no one had ever been before indications as certain as when he refilled his pipe the story was ended.

"You youngsters will hardly remember, but most of you old timers ought to recollect Bob Kemp, engineer who dropped dead at his throttle after hittin' a hobo—least hobo he was always supposed to be, and nobody never knew the difference, barrin' myself, and that's what I'm goin' to tell you about.

"Bob Kemp and me come on the road

at about the same time, and him and me was thrown a heap together, both out on the road and off duty. A better-hearted or more honest and proud devil-may-care, and just afraid of nothin', 'less it was a holy horror, somehow, of tellin' a lie, never swung scoop nor squinted at a steam-gage, and seem' then I was bettin' the devil would get the hindmost man, him and me moved along fast and loose, and most of the time the both of us was swimmin' in hot water.

"Then Bob fell in love with one of his flames along the line that he'd been tearin' the whistle loose at whenever he passed her way, and of course, as I says before, bein' headstrong and afraid of nothin', courted her with the same mad, whirlwind rush he did everything, and finally one day he come down to the roundhouse and, grinnin' like a cut watermelon, confessed he'd married her.

"Nobody, of course, said anything about it, seein' the thing had drifted that far, but all of us knew Bob had dropped down a notch or two. The gal wasn't in the same class with a fine young fellow like him. From then on, however, Bob buckled down to it in earnest, and it wasn't long before he was pullin' a passenger. As for myself, havin' no brakes to keep me from slidin', I came pretty near goin' to the junk-heap altogether when Bob got coupled up.

"A little later, this bein' a new division then, and Bob a steady, promisin' young engineer, he was transferred down here, and me, owin' to bein' so uncertain in my habits, hadn't climbed no higher than jugglin' coal. It was years after the G. M. hauled me up with a pretty round turn, and to give me a last chance and get me away from old associates, shipped me down here, too.

"Next thing I know I'm handed a ticket callin' for a No. 6 scoop on the fast mail, same train then that just unloaded yonder. When I reported the first mornin' who do I find lookin' her over but my old-time buddy, poor old Bob Kemp.

"Of course I'm tickled all right, but the first glance I took of him gave me a shock—he's so mighty changed. Had a kinder hangdog, dull, worried look in his eyes that were always so bright, then seemin' sometimes tryin' his blamedest to be as cheerful as his old self, but the whole effort fell flat, and gave you the idea he was just puttin' it all on. Why, sometimes we'd make a whole run and him never sayin' a word

"Finally it all leaks out little by little, him droppin' a word now and then, and me unconsciously piecin' 'em together, till finally I had the whole rotten story—least I thought I had it all then.

"Seems the gal had done what some of us 'I told-you-so's' had always predicted—another fellow and the usual thing that pans out with that class. Queer how them true-blue fellows so often get burnt with that kind of trash, and Bob must have thought a heap of her no account soul, for in spite of his pretendin' to despise the name of her, he was first blamin' himself, then the other fellow.

"Anyhow, I could see the thing was always ranklin' in his mind, and I always hated to hear him start to talk about it, and only listened because I saw it eased him some to get the 'tarnal rank stuff out of his system.

"One day when he was gloomier and crankier than usual, and kept pullin' a long envelope out of his jumper pocket, and after readin' the letter again for the fortieth time would shove it back with a whole-souled curse, and yank out the throttle so sudden he'd almost set me down in the coal; then again he'd seemin' crawl inside of himself and clean forget where he was at or where he was goin'.

"Thinks I to myself, 'Such tactics might do for a local freight, but on the best train on the road it means trouble for somebody.'

"After that I watched him close, and two or three times had to reach over and swing on the whistle. He'd jump then, look sour at me, and growl:

"'Blast you, Coogan. Don't you never do the likes of that again.'

"I didn't say nothin', for it would bring him to his senses for a little while; then he'd fish out the letter and read it again.

"I kept speculatin' and wonderin' what was in the letter, and gettin' madder and madder every minute, me cookin' up, tryin' to steam her and watch him

too, till, finally, when he jumped her around a curve, he dumped me in a heap against the side of the tender, and when I got up, nursin' a sore shoulder, and squinted at him, with the letter in his hand, sittin' there starin' at nothin', I was fightin' mad all the way through

"I jumped up beside him and says, glarin' and bristlin' and itchin' all over:

"'Looky here, consarn you, Bob Kemp, fork over that letter, and jump out in the ditch by your lonesome, if that's where you're headin' for.' I shook my naked fist under his nose, and I believe for a fact, if he hadn't given it up, I'd jolted him worse than bein' sideswiped.

"Of course, two seconds later I was sorry and ashamed, but I crumpled her up and rammed her down in my pocket, and only once more did I have to attend him that run. When we came to the limit post, before shootin' here in the yards, I looked up after fixin' my fire to see where we was, and Bob hadn't shut her off, and the paddle was against us, so I just took the throttle clear out of his hand, cut her off and give her a feel of the air.

"I looked for Bob to rear up and cuss me, and I was goin' to take it meek and low, not knowin' how bad the trouble was that was gnawin' his mind; but he sits up with a surprised jerk, and, feelin' for the letter then lookin' at me in a queer way, he says, almost in a whisper.

"'You're a good pardner, Coogan,' and he drops his head and says, half to himself, 'I knew it would come out. It's the bad blood she left him.' Then his face flushes up, and he grits, 'The young whelp!' and, with a groan, he flopped over on his arm rest, and you can believe me or not, men, bust out with dry sobs shakin' his shoulders, till I felt like crawlin' back in the coal and bawlin' myself.

"I didn't see Bob again for over a month."

Coogan got up and glanced into his cab, as, with a deafening roar, the company's pride, the Southland Limited, left the yard with a whirl of cinders and dust trailing her skirts. Like a wild turkey drumming, she puttered up the hill.

"Did you read the letter?" an impatient one asked as Coogan came back and settled in his seat.

"The letter? Oh, yes. That cussed letter! I forgot I had it stowed away in my jeans till I stripped in the washroom after the run, and found it; then I carried it on three or four runs with Fagin, thinkin' Bob would show up, till finally the recollection of it and his crazy actions was gettin' me near as batty as Bob. Then I read it.

"I've forgotten the wordin', but it seems two college kids gets in a game of cards with a stranger; the regulation scrap arrives on time, which same one Hoyle forgot to make rules on, and, accordin' to the stranger, who was bein' held in limbo, one Robert Kemp, Jr., was the kid that done the killin'.

"Anyway, the lawyer who wrote the letter and had been dealin' out Bob's allowance to the kid, said the boy had been a pretty high-spirited young 'un, though nothin' much worse than the general run at his age—if they got the chance—but from the fact of his disappearin' after the trouble it made things look pretty black for the kid

"The whole road had read an account of it in the papers, but nobody ever thought of connectin' Bob with the matter, because no one ever knew Bob had a boy, seein' his wife has run off shortly after their marriage

"Then, one morning I'll never forget, Bob shows up, dull and wrinkled, and only a shadow of himself. The fast mail left then at 3.10 A.M. We backed out of the roundhouse and coupled on as usual, and we was givin' her a final look over from the ground, to fill in the half hour before we was due at the station, when, just as Bob comes around the pilot to see—particular, like he always was—what I was doin', we heard a sound of scufflin' along a string of empties that had just pulled in.

"Presently one of the company detectives, with a cocked gun in his fist, drags a young fellow into the glare of our headlight, and though the bull's havin' a time of it, both of 'em bein' pretty well mussed up, finally staggers up near where we are standin'.

"As the full light shone in both their faces I see Bob straighten up stiff and rigid as a clinker bar. Then his face

and fingers twitched, and his oil can dropped with a startlin' clang on the rail. The boy looked at Bob with a dumb, scared look.

"'Dad,' says he, hardly above his breath, and as pitiful and pleadin' as a kid beggin' off from a lickin'.

"Bob gulped hard, and sort of wavered, but never give one sign of recognition in them piercin' eyes of his.

"'Do you know him?' breaks in the officer to Kemp, but at the same time holdin' fast to his game. 'I got him off the rods of Extra 947. I thought he answered the description of a young feller of your name that's wanted mighty bad for a killin' job, but he says he's your son.'

"Bob and the officer eyed each other, but never a flicker in Bob's eyes, though I could notice a little pulsin' twitch of the muscles around his jaw. Then the officer adds, as though he'd like to be quit of the job:

"'Of course, Mr. Kemp, if he's tellin' the truth I'll turn him loose, though I never heard tell of you havin' a son.'

"The officer looks keen at them both in the bright light, first from one then to the other, as if he was comparin' their features; then a sort of smile spread over his face, and he lets loose the kid.

"'Guess it's one on me, for I'm a Dutchman if he ain't a chip of the old block, if you'll bar the wrinkles and scatterin' gray hair; so, Mr. Kemp it's only up to you. Pass the word, and I'm savin' nothin' about it.'

"The strained, pleadin' look left the boy's face, and a glimmer of hope took its place. Bob swallered hard, but never a tremor. Gosh, it was so strained and quiet I could hardly keep from yellin'. My knees was numb and my heart was a poundin' like a pump the worse for the need of packin'.

"Then, when I was ready to bust, blow up, or split wide open, a convulsive shudder shakes Bob from pilot to tender, and with fire flashin' in his eyes, he lurched forward and thunders at the officer:

"'No, curse you! No blood of mine kills and then, like a coyote, sneaks away from the music!'

"Kemp rushed at them like a wild animal, fair frothin' at the mouth, and with fists and arms wavin,' screamed:

"'Take him away! Take him away, the blood-stained cur! 'Tain't mine, it's his—his mother's cursed!' then he chokes with a horrible gurgle, but before he reached them the spasm was over. He collapsed and pitched full length between the rails.

"Both the officer and me jumped to grapple with Bob, and durin' the excitement the kid disappears. I got Bob straightened out in some kind of shape, but against my advice he climbs in the cab, and we make it out on time.

"Shamefaced, I gave Bob back his letter, then I got the whole yarn on the run down; how he had took the baby when his mother run off, and sent him to a distant city, so he would grow up under the best conditions and never know but what his mother was dead; kept him plentifully supplied with money, and finally sendin' him to college, bankin' and prayin' till he was about half crazy that education, and that sort of thing, would wipe out the streak of bad blood in his makeup.

"I wished he hadn't told me, when I come to understand how poor old Bob, proud as a peacock and straight as an arrow, must have hoped against hope, and banked against a chance, always alone and in silence all them years, tryin' to make a good man of that kid, then have the whole rotten thing turn out as it did. It near got my goat when he winds up with a moan that sounded like the death rattle itself:

"'Even worse than I feared—worse than I feared.'

"No use of me tryin' to console him with 'Mebbe he didn't do it. You ain't got no right to condemn him that way without hearin' his say so. Just wait; everything'll come out all right.'

"Bob was bull headed, worse than I'd ever seen him before, and as set as concrete in his belief the kid was wrong.

"'No use,' says he, wavin' me away and gettin' mad again; 'if he didn't do it, what for did he run? That's the worst part of it, Coogan, the very worst part of it. If he hadn't turned coward I'd stuck by him.'

"There wasn't a scary hair in Bob's makeup, and when he talked that way there wasn't no use of arguin' with him.

"I think it was on the second run after, comin' this way, and we'd left

Sanford ten minutes to the bad, havin' to wait to pick up the G. M.'s car comin' off the branch, when Bob hollered down in the gangway, after readin' his orders:

"'See if you can melt the grate-bars, old-timer; the G. M.'s in a hurry and says, "put her through."'

"The grate-bars come through O.K., but it most melted me, and when we slowed down from clippin' 'em off at a seventy-five gait, for the horseshoe and reverse, before shootin' her down the grade to Kelly's Run Bridge, the ten minutes was right there to the good, and Bob, so help me, was blamed near smilin'!

"Then, as we pitched and rocked around the last of them ugly curves, dreaded by every fast man on the road, and straightened up for the breath-takin' slide down the hill to the bridge, out of the tail of my eye I saw Bob reach for the whistle and yank her like mad, shut her off, and reverse, then give her the air, at the same time grittin' between his set teeth:

"'God help him -why don't he get off?'

"The tires were gringin' and meltin', and the sand a flyin', and I ain't stretchin' the point when I tell you I didn't lose no time hoppin' up on my side to see what's the matter.

"I just got a glimpse as we pitched down on it of a crazy, staggerin', wildly wavin' figure, with face drawn and contorted in its earnest intentness on makin' us understand its warning.

"Then the likes of which I hope I'll never see again happened a whole lot quicker than I can tell it to you.

"I'll swear Bob had his engine under control, and could have stopped her in time, and though it was only a fleeting glance I got of the face, I glanced over at Bob in horror, but in that fraction of time the poor, totterin' figure hooked its tired feet in a tie and sprawled headlong over the rail, and I realized Bob had recognized the face, too.

"With a fixed stare in his eyes, stern and determined, and his lips movin' like he was sayin' a prayer, Bob threw her over, then yanked her wide open, full speed ahead. The change in motion was something terrific, and we leaped forward like a shot out of a cannon.

"I see Bob was nothin' but clean gone crazy. I was like a cat in them days, and over the boiler I rolled, without losin' time in the gangway, and snatched the throttle from Bob's rigid hand—but just a little too late.

"You old heads all know that sort of soft jar that gives the engine just the least bit of a shiver—we'd struck him, and Bob, with a wail like a tortured soul, but still somethin' in the cry seemin' to ring with triumph, yells, as he falls off the seat in a limp heap:

"'Blast 'em! They'll never hang son of mine. He's mine, and I'll do the punishin' myself!'

"With the help of the porter, I run her in. As I said before, they unloaded 'em both right over yonder—and they're sleepin' the long sleep there up on the hill where you see the dull white eyes of the city of the dead starin' unblinkin' and unseein' at the risin' moon.

"You see, when the boy disappeared, the night of the muss in the yards, he took to trampin' to hide himself, and no wonder, seein', as the poor kid must have, that the whole world, even his own dad, was against him. As he footed it over Kelly's Run Bridge he discovered a broken fish-plate and a tie split and slewed around till the broken end of it wedged against and spread the end of a rail—just a little reminder No. 62 left, to let us know he had a brake-beam drop right there when he went over the bridge an hour before us."

There was intense silence for a time, as Coogan fished his paper of tobacco from his jumper pocket and with a rasping sound thoughtfully rolled it between his horny palms, then some one said in a doubtful tone:

"I dunno, but I don't think Bob ought to have denied knowin' the kid. If a fellow can't depend on his dad, who can he trust in?"

"Well," said another, equally hesitating and doubtful, "law's law and right's right. If the kid done it, he ought to been—but then again—your own boy" Then he paused vacantly, at a loss how to conclude

"Well," said the yardmaster, as he got up and stretched his legs, "however that may be I don't exactly know myself, but I'm sure of one thing—the kid's last act paid his score and left a balance in his favor."

"Of course, the kid's endin' was the best thing that could happen," said Coogan's fireman; "but it seems pretty tough for fate to put it up to Kemp to do the punishin'."

"Them's my ideas exactly," resumed Coogan, as he slowly filled his pipe. "I agree with you all. Sometimes I wonder and think one way, then I think and wonder another, and always wind up by not thinkin' or wonderin' at all." And, pressing the charge down in the bowl of his pipe with his big, oily finger, he climbed up in his engine; then, leaning out the gangway, added as if as an afterthought:

"The worst of the whole matter was, as it turned out later, the kid didn't do the thing at all it was the stranger. The boy just got scared and run off, like any young 'un, because he was present at the shootin', and Bob had made the idea if that kid goin' wrong the one idea that filled his whole life, till he was just plumb batty on the subject, and, I dare say, would have been disappointed if nothin' had happened.

"So if, as Jim says," referring to his fireman, "the kid's takin' off was the proper thing, then how much more appropriate was the wind-up of Bob? He was better dead a hundred times than live and know what he'd done."

A distant wail floated over the hills and dales. Then a headlight gleamed over the crest of the hill, and with its rays creeping and glinting along the shining rails seemed finally to attach itself by two sparkling silver threads to the yards.

"That's her!" called the yardmaster, hustling over to his office. Then he called back, as the headlight grew stronger: "She's only the first of your troubles to-night I can make out from here she's carrying green signals."

The firemen had already leaped to their engines, and in a cloud of black smoke arising from the punched-up fires the That Reminds Me Club adjourned.

HE WANTED A LOWER.

TWO strangers met at one of the small tables in a dining-car. They found a common bond in the effort to secure something to eat, and by the time the coffee came they were on friendly terms.

"I wonder if you will do me a favor," said the first, as he paid his bill. The other man seemed receptive, and the first one continued:

"Have you a lower berth for to-night?"

The man across the table nodded

"Well, I'm traveling with my mother, who is rather well along in life, and I'm anxious to make her comfortable. Would you be willing to give her your berth?"

"I should be delighted," responded the stranger.

They went back to the sleeper, where the accommodating man was presented to the other's mother, a white-haired old lady with a charming face.

The Good Samaritan had exchanged his lower berth for the upper, belonging to the old lady, and was radiating with a sense of charitable kindness.

It led him to remark affably to the other man:

"But where are you going to sleep?"

"Oh, that's all right," was the answer. "That's my lower over there."

WROUGHT IRON SUPPLANTING STEEL.

THERE is an increasing tendency in recent construction to go back to the greater use of wrought iron as compared with steel. This reversion is already on a considerable scale. In Pennsylvania alone there are now fifty-three iron mills in existence, and probably over two hundred in the United States. The prevalence of rail breakages, owing to piping and segregation in steel, could not possibly obtain in wrought iron, says *Railway and Locomotive Engineering*. Lamination troubles were frequent enough in the old days of iron rails rolled from piles, but if rails had again to be rolled for iron, piling would be an obsolete institution. It is well known that because of the excessive corrosion which British railway companies have discovered in mild steel, they have now largely come to the conclusion that with regard to the rolling stock they must revert to iron, sacrificing superior strength to other considerations. There was also a marked preference shown in the demands from the colonies for galvanized sheets of iron instead of steel owing to the greatly lessened liability of the former to corrosion.

White Demons.

BY JANE WARREN.

SYNOPSIS OF PREVIOUS CHAPTERS.

IN a village thirty miles north of Peking lives William Warren, his wife, and daughter. Mr. Warren is in business with one Leung Lo Nieh, and through this partnership he has been enabled to keep on friendly terms with the natives of that section. Edward Kingdon, Jane's *fiancé*, arrives on the scene with news of an uprising not far distant, and alarming reports near at hand. He urges flight to Peking. Ominous sounds reach them from the near-by village, and they decide to leave that night. In the pursuit which follows the bridge is fired and Jane is captured by Tsing Lao, leader of the local Boxers. He had asked previously that Jane should be his wife.

CHAPTER IV.

Death and Devastation.

DO not imagine that I regarded this monstrous insult except to heed it by contraries. He held me so that, at the instant, I could not bring father's revolver to bear upon him nor Edward's vial upon myself.

I would have screamed or tried to, even if I had felt the edge of his knife against my throat. But scream I could not, for though my lips parted, my voice was stifled by his rough hand. All the sound I made, therefore, was a dismal gasp that might not have been heard a dozen feet away.

"You shall not speak!" he hissed, and he pressed his hand the harder against my face, while with one arm he tried to pinion both of mine.

Strong though he was, his procedure put him at a disadvantage with respect to his full strength. He could have killed me easily; to bear me away alive was a different matter when one of his hands was occupied in stopping my mouth.

Just how I struggled I cannot describe, for I am by no means sure of the details. I know that my chief thought was for the revolver.

I could not reach it, owing to the pressure of his body against mine. One of my arms was held tight. The other I managed to free, and if I had been the man I wished myself, I might, perhaps, have dealt him a stunning blow.

I think that might have been possible, because he was so manifestly careful not to do me serious injury, but had I struck him I doubt whether he would have so much as winced at the blow.

As it was, in wresting my arm away and swinging it about with no conscious design, my hand came in contact with his cue.

I seized it about midway and yanked it with all the force I could command.

His head went back, and he gave vent to a wrathful grunt. For one instant I felt the pressure of his hand on my mouth relax, but it was spasmodic merely. My voice was not freed, and while I tugged at his cue he lifted me in his arms, held me like a vise, and carried me rapidly down the path toward the river.

What new device I might have tried I know not, for suddenly the blow I would have liked to give him was delivered by Edward, who came running up the path.

Tsing saw the blow coming just in time to drop me, but not in time to avoid it. I fell at one side of the path and Tsing at the other.

Began in the June The Railroad and Current Mechanics. Back numbers for sale at this office.

He bounded up as if he had been made of rubber.

"Has he hurt you, Jannie?" said Edward as the Chinese fell upon him furiously.

For a few moments Edward had to give all his attention to self-defense.

I have heard the Chinese referred to as an undersized race. What basis there is for the assertion I know not, unless it be among the people of the southern provinces, which I have never visited. In the north they are neither deficient in stature nor puny in development.

Tsing was uncommonly stalwart, tall, and with powerful shoulders. In a calm contest of mere strength I have no doubt that he would have proven himself Edward's superior; and now, when the American had all the advantage that comes from right and the fact that he was defending his sweetheart, my heart stood still, as time and again it seemed that the barbarian would triumph.

It was a prolonged combat short enough by the watch, it may be, but terrible in its variety of struggle and in the deathly earnestness of each antagonist.

They were constantly changing ground and moving steadily toward the river.

Edward had closed with Tsing to prevent him from using a dagger. In close quarters he was impeded, as I had been, from drawing his own weapon. Each tried to shake himself free, without daring to lessen his grip on the other.

As soon as I could pick myself up, I followed them, hoping and trying to find a way to do something effective.

I had my revolver now, but I could not use it without risking Edward's life, for he and his antagonist were never still an instant. Twice they stumbled, but in each instance they fell only to their knees, and were up again before I could reach them

At length they had fought their way to the very brink of the river.

My heart choked me, for it seemed that both must go over if they continued the struggle longer.

Then, suddenly, the place was illuminated. The Boxers on the other shore had fired a summer-house. It was a pretty but flimsy pavilion, overlooking the stream, and it flared to the match as if it had been so much paper. By the light it made I saw my opportunity.

The combatants were still at close quarters, but at this instant there was an advantage with Edward which in the next might be turned to his destruction.

His right hand gripped Tsing by the throat. The Chinese was making a strenuous effort to release Edward's hold and at the same time send him over the bank into the river.

With his left hand, Edward was vainly reaching for his revolver. I ran up to him and pressed mine into his hand, not daring to use it myself because of the same fear that had made me thus far a useless spectator.

Then I remembered my former attempt with Tsing's cue, and without reflecting that I was so placing myself that Edward would not dare to shoot, I caught the long braid and tugged at it with all my strength.

What with the sudden tug and Edward's push, Tsing came tumbling on his back, and I had to step quickly to get from under him. I scrambled away, and when I looked around Edward was picking the brute up

It must be that the breath had been knocked out of Tsing by the fall, for he was comparatively motionless.

With a muscular display of which I had not dreamed that Edward was capable, he raised the Chinese above his head and pitched him into the river.

Edward panted heavily as the barbarian left his hands. Above the splash with which the current received its burden I heard him give vent to a satisfied "There!" just as if he had accomplished some difficult feat in the field of sport

I laughed—I could not help it! The peril and the excitement of triumph made me other than my normal self. Say, if you will, that a woman should have been overcome with horror. I was not.

My heart thrilled with the joy of love to the exclusion of all else, and I threw my arms about my lover and kissed him.

He was surprised. I suppose it is no wonder, but, ah! how the flames of the burning summer-house revealed the tender love in his glorious eyes!

"You did it, Jannie," he said. "I never should have been able to let go the scoundrel if you hadn't taken advan-

tage of his weakness. Moral—don't wear a pig-tail," and he, too, laughed a little.

"But come," he added; "we must not delay. It's a wonder those maniacs on the other side don't shoot arrows at us. They may not have seen us. We must hasten to rejoin the others."

Then I remembered, and I started so violently that Edward thought I was wounded.

"No," I answered him; "I have forgotten poor Zila."

"Where is she? Not hurt, I hope."

"I fear she is dead, Edward," and as we hurried up the path I told him what I knew. In a moment we were bending over the poor girl's body.

"She is beyond our help," said Edward pityingly, and he stood up with his hand on my arm

"But we cannot leave her," I began.

"We must," he interrupted firmly. "Any one of us would lay down his life for any other, but the living must not be sacrificed for the dead. Come, Jannie."

There was no help for it, though it it had not been for thought of my mother I should have pleaded for as much risk as would be involved in a hasty burial; but every instant was precious if we were to save her and ourselves.

This I realized more fully as Edward unfolded to me the plan he had made for our escape.

"I thought of little else," said he "while I was journeying from Canton, though I could not believe that we should have to resort to this particular move. Plan, Jannie! Why, this is only one of many.

"I made them to fit every contingency I could imagine, and when I arrived to find you still here I was certain that one or another of my most desperate devices would have to be tried. I was sure of it after Wu reported the death of the child, and I sent him away to arrange for some of the details of our escape."

"Shall we not see him again?" I asked.

"I believe we shall. He's a bright boy, and will do his part. It remains to be seen if luck and nerve will let us do ours. I prepared for blowing up the bridge while you were packing, and the delay in departing was designed to make it as sure as possible that the Boxers would pursue as far as the bridge and get caught.

"Of course, we got rid of only a few by that device, but we left those on the other shore more enraged than before. Discomfited at our slipping through their hands, I count on them to vent their anger against the property, as they seem to be doing."

"Yes, they must have set fire to the house," I said, noticing a much brighter glare on the foliage.

"I cannot help hoping so," he responded; "for in that act is our one chance of getting safely out of their reach. It goes without saying that all the Boxers in this vicinity are now in that howling crowd. They are too incensed, I hope, to think what we may do. While they are occupied in destroying property we may slip by Shanshan unobserved."

"But the boats," I began.

"Have been taken over to this side of the river," he interrupted, "and hidden among the bushes, where we can find them, provided Wu accomplished the first part of his errand. It was the easiest part, and I have no doubt that we shall find the boats, but we cannot afford to lose a minute."

We went on in silence for a moment, when Edward uttered an exclamation of surprise

"See this!" he said, holding his right hand toward me.

His fist was tightly clenched over some ragged ends of cloth and a broken cord.

"Odd, isn't it?" he added. "I haven't loosed my fingers since I pitched that rascal overboard. It shows that my nerves were pretty hard set on that task, doesn't it?"

"I think it shows something more," said I. "You picked Tsing up and tossed him into the stream without opening your hand, else those tatters would not be hanging from it. That suggests that you must have had some purpose in keeping your hand closed."

Again Edward exclaimed in surprise:

"To be sure," he said, "and I had clean forgotten. You drove it out of my mind, Jannie. Let's see what it is."

He opened his hand and held it up to the glare of the burning buildings.

I saw something rectangular pressed so hard into his palm that it stuck there even when he extended his fingers and held his hand straight up. Then we passed into the shadow and he lowered his arm.

"What is it?" I asked.

"I don't know; but I remember feeling the thing when I managed to get my hand on Tsing's throat. It was in my way, and I wanted to wrench it off. I gave it a yank, the cord that held it broke, and some of the cloth ripped, but my effort nearly did for me.

"It compelled a slight relaxation of my grip, and Tsing was quick to take advantage of it. He nearly threw me, but I fastened onto him again, regardless of the obstruction. Just then you swung yourself on his pigtail, and when we went down his neck-wear gave way, leaving the thing in my fist.

"It had bothered me so much that I determined to keep it, if I could, as a trophy, and I recall how I doubled this fist under him when I threw him, in order that I might not have to drop my prize. Then you made me forget all about it. If the sun rises on us tomorrow we'll examine it."

Just then we came to the limits of our gardens. A gate in the wall was open.

"Edward," I said anxiously, "what has become of father and mother?"

"They're ahead of us somewhere," he answered; "we shall find them at the boats if we do not overtake them. That they have passed here is proven by the open gate and the fact that the key is in the lock. Your father understood this part of the arrangements. I went over the plan with him while you were waiting on the back veranda. We must pause a second or two, Jannie, to leave the gate in its usual condition."

"But there are no Boxers on this side of the river, and the bridge is down," I said.

"Suppose," he answered, "the wreck of the bridge has stuck between the banks? Some of them might cross. Now, locking the gate ain't going to prevent them from scaling it; but if it's locked from the inside it may mislead them into thinking that we went out by the western way so as to get to Leung's grounds. I rather count on them to reason in that way."

Saying this, he was closing and locking the gate. He was then inside the garden, and I outside, and I felt a momentary tremor. As if to still the briefest uneasiness, he kept on talking.

"I'm locking the gate from this side because there is also a bolt here that I want to push into place. There, that's done."

He climbed the gate and leaped down beside me.

"It has just occurred to me as odd," he went on, "that no more Boxers than Tsing were on this side. Of course, he was not with the attacking party. He must have crossed the river at Shanshan and come up on this side earlier in the evening, theorizing that we would be driven to escape by the back way. I'm inclined to admire his shrewdness, and I'm the more glad that I got him out of the way."

"You said that I did it," I remarked, hoping to distract his mind from speculation concerning Tsing. I did not succeed.

"You saved me, but I gave him his *coup de grâce*," said Edward.

I admired the delicacy with which he gave me undue credit for effectiveness while insisting on relieving me of feeling responsibility for the death of a human being.

"It is odd that he did not bring some of his crew with him. I guess, Jannie, he must have been a special admirer of yours."

"Oh, don't, Edward!" I shuddered. "It is all too horrible."

"So it is," he assented calmly, "and I did not mean to speak lightly of it, but, surrounded as we are by peril, it is necessary to consider every possible aspect of the situation. It might be a matter of great importance to us to be sure that Tsing did not take any of his followers along."

I was silent, trying to bring myself to telling him what father had revealed to me of Tsing's design.

"It would be no discredit to you, Jannie," Edward resumed, "if that scoundrel imagined himself in love with you. If I only knew that to be the fact, I should know what to think on another more important matter."

"Tsing offered to protect us all if I would become his wife," I said in so low

a voice that I feared my words would be inaudible and that I should have to repeat them.

"Then," said Edward promptly, "I know that your father and mother are safe."

"What!" I exclaimed. "You have been anxious about them?"

"Only since that thought occurred to me at the gate," he responded; "and the anxiety is all gone now."

"I do not understand."

"Dismiss all fear for your father and mother and I will make it clear. To begin in the middle of things, I reckoned that your mother could not walk as fast as the rest of us, or, at all events, that she should not if it could be avoided.

"I knew that there would be some little delay in touching off the powder at the bridge. Of course, I wanted to be near you, and it is just as well that I did not have you go on with your father and mother, for Tsing would have made his attempt at abduction in any case, and if you had been with your father there might have been a greater tragedy."

"Tsing would have struck at them both in the dark as he did at poor Zila. And, Edward, he must have seen them—" I hesitated.

"Don't be anxious. He let them pass because he saw that you were not with them. No one else has molested them, for we found the gate open. To continue: I arranged with your father that he should go directly to the boats, reckoning to catch up with him before he got there. Now, don't you see, if Tsing came around to the back gardens merely to massacre he would have brought others with him?

"No, Jamie, he came solely on your account! That being his errand, he would be alone. We shall find your father and mother at the boats."

"Oh, I hope so! But, Edward, why was Tsing carrying me toward the river?"

"Probably in his frenzy he did not realize that the bridge had been blown to pieces. Moreover, he was taking you in a direction opposite to that from which you might expect help. It was chance, or the guidance of love, that led me up that path which he was descending."

"I cannot believe it was mere chance, Edward. Do you mean to say that you had heard nothing?"

"Only the shrieking of the fiends on the other shore. I could not tell why I turned aside from the path up which I had started, but I was aware of a powerful impulse to take another. I did so, and the first I knew you two came stampeding right at me. I hadn't time to draw my revolver."

All that Edward had done thus far was wise and far-seeing. I had the perfect confidence in him that only a woman can have in the man to whom she has given her heart; nevertheless, I was sadly apprehensive. His reasoning convinced me, but I longed for the evidence of sight and touch.

"I can walk faster," I said; "I can run if you wish."

He took my hand and we ran side by side until I had to slacken the pace for lack of breath.

"We are likely to lose what we have gained by overdoing the haste," he said gently.

"Yes," I panted. "I have learned the lesson. I will walk only at such a pace as I can maintain."

We were crossing a wide, undulating wheat-field. The Tungsi pursued anything but a straight course between our home and the village. It made an immense sweep to the north that more than trebled the distance we had to walk to come to the point where it entered the plain and flowed smoothly enough to permit of navigation.

On the way we crossed an elevation from which we could look back at the house. It was a brilliant mass of flames. That the work of devastation was still in progress and the Boxers, therefore, were still engaged there, we could see from small lights that moved about at a little distance from the main fire.

The infuriated wretches were making torches of the falling woodwork, apparently, and setting fire to every inflammable object on our part of the estate. So far as we could tell by a hasty glance from that long distance, Mr. Leung's property was not molested.

At length we left the undulating ground and made toward a grove that I knew was nearly opposite our boat-house.

Father and Mr. Leung owned a fairly large fleet, most of the boats serving to carry produce to the markets along the Pei-ho, a few being designed for pleasure merely.

There was a wharf on the north bank, where produce boats took on their cargoes from the fields on this side, but that was a long half-mile below the grove. As we entered the denser darkness of the grove my heart leaped at the sound of my father's voice.

"I began to fear you had been hoist by your own petard," he said.

I ran to my mother and folded her silently in my arms

"Had a little tussle with Tsing Lao," Edward responded. "Have you found the boats?"

"There is one here. It is amply big enough for five."

"There are only four of us now. Zila did not escape."

"I thought she crossed the bridge ahead of you?"

"She did. She met Tsing."

"Poor Zila!"

That was father's only comment. Mother, who heard, pressed my hand tightly, but said nothing. How the human heart, so quickly responsive to woe, learns to acquiesce in tragedy when the air teems with horror!

But yesterday, and we would have wept at Zila's death if it had occurred peacefully. To-day, butchered, a pitiful martyr to her faith, she drew no tears to our eyes. Not unfeelingly, in its repugnant sense, but inevitably, we had to give all the energy of thoughts and emotions to ourselves.

CHAPTER V.

The River's Secrets.

"I THINK," said Edward, "that if we should hunt for other boats we should not find them. I told Wu to use his judgment."

"To what extent?" asked father.

They were stowing our bags and preparing to push off as they talked. Mother and I were already on board.

"His first business," answered Edward, "was to hide a boat for us. If that took a long time, he was to pay no attention to the others, but if he could manage it, he was to secrete them also, or scuttle them."

"There are other boats than ours along the river."

"A few, yes; but none so good as yours. My idea was to cripple the enemy's resources as much as possible."

"They are not likely to pursue soon, if at all."

"Not for an hour or two, I think. When your house and other buildings are in ashes they may search for us at Leung's. Not finding us, they will think of the river. Then they will go to the boat-house.

"If Wu has scuttled the whole fleet there will be evidence of that fact in poles and superstructures sticking out of the water. That ought to puzzle them, for I doubt if they will be able to take such account of the fleet as to be certain that one boat is missing."

"I hope your reasoning is as correct as it is shrewd, Ned."

"It's all guesswork, of course; but a good guess is better than going it blind. Are we all ready?"

"I think so."

"Let her go, then. Wait! Have you kept an eye on the river since you came?"

"I watched steadily till I heard your steps."

"Seen anything significant?"

"Yes. The explosion occurred when we were about half-way here. Of course, the current ran faster than we could, and wreckage was floating by when we arrived. There was a good deal of it."

"The bridge was completely shattered, then."

"If not by the explosion, it was broken to pieces on the rocks. Some of the fragments were as large as a small raft. A man was clinging to one of them."

"Alive?"

"Very much so. He was making a great splashing with his feet, trying to guide the wreckage to the bank. He succeeded in making a landing just across from here."

"Tsing Lao!" said I.

"Unlikely," responded Edward. "Tsing was ducked after the bridge had got well started down-stream. There was nothing left for him to cling to

except unfriendly rocks. What became of this man, Mr. Warren?"

"He started back at once in the direction of our house"

"You saw no other men?"

"No, though it might be possible for a man to float by and not be seen in the darkness. It is three or four minutes since the last of the wreckage passed."

"There is more of it," said I, pointing to mid-stream, where two small fragments were whirling round and round

The current here was still very swift, though the river was much broader than it was at the gardens and wholly free from obstructions.

"I should very much like to know," said Edward, "whether those are pieces of the bridge or débris that the ruffians threw into the water subsequent to the explosion. Push off!"

Our boat was not one of those designed for pleasure sailing. Wu had cleverly selected one of the smallest produce boats—perhaps by Edward's direction; I never inquired into the matter—so that if we were observed from the banks it might be supposed that one of the independent farmers was merely traveling to the market.

In construction and appearance it differed greatly from boats that may be seen on American rivers. Built of the lightest materials, with a nearly flat bottom, it could be navigated in the shallowest waters.

At the after end was a tiny platform for the pilot, steersman, and half the crew—all one person. Ordinarily, the other half of the crew would be taking his ease forward beneath a movable roof of bent bamboo.

In the event of carrying perishable freight, enough sections of the roof would be taken to cover the boat from the forward end to the pilot's platform, thus making the craft appear somewhat like a half-submerged cylinder

On its journey down-stream to some market town, the duty of the pilot consisted mainly of steering the boat by means of a long pole. When the return trip was made in an empty boat, the sections of roof would be stacked together, thus leaving the boat clear from end to end, so that both members of the crew could pole it against the current.

At night they would tie to the shore, set up enough of the roof to protect them from the weather, and sleep until they were ready to go on again

Wu had roofed over about half the length of the boat. Mother and I crawled under and sat on the boat's bottom, our heads then being almost, but not quite, in contact with the arched roof.

Father, whose active work had made him an expert riverman, took the pole at the stern and Edward stationed himself forward to watch.

At first the current bore us swiftly along, for it still had the impetus gained by its descent from the hills. It was but a few minutes before we were passing our boat houses.

"Wu scuttled them," I heard Edward say, and I put out my head to see. There was quite a forest of poles rising from the water, and here and there the roof of a house-boat.

They occupied fully half the width of the stream, and father was steering wide of them to avoid a collision.

"Run in a little closer," suggested Edward; "I've had my eye on those last fragments that came down. One of them has stuck against a mast. I can reach it with a hook."

The boat was turned accordingly, and as Edward reached out and pulled a piece of board alongside, our craft vibrated disagreeably and seemed likely to stick there

Father pushed vigorously on the pole. With more vibrating and grating, we were off.

"What was the matter?" asked mother.

"We fouled a submerged roof," father answered. "Narrow pinch, that, for a stick of wood"

"It was worth it as long as we got away," said Edward.

He took the fragment aft, where father examined it as thoroughly as possible in the darkness. Of course, there was no thought of striking a light.

"There's no mistaking it," said father presently; "it came from the bridge. It's a part of the rail."

Edward tossed the fragment into the water and returned to his place forward. I asked him if he was satisfied

"Of course, I am," he answered: "I got the information I was after. We'd

better not talk about it, Jannie. We shall be passing the village shortly, and we must do nothing to attract attention, even though the people now in the village may be entirely friendly to us."

I could not help suspecting that Edward welcomed this excuse, sound though it was, to avoid discussing the significance of the discovery.

To my mind it meant that Tsing Lao might have escaped death when he was plunged into the river.

If one man had been saved from dashing to death against the rocks, why not another? If some fragments of the bridge were long in coming down-stream why might it not be that Tsing had luckily grasped one of the belated pieces that had caught, perhaps, between two rocks, and so floated to safety?

It was a most uncomfortable speculation, and I dwelt on it as little as possible, but I wondered if Edward's reasoning took the same course.

It seemed to me that with his keenness he would apprehend the trend of my thoughts and say something to disabuse me of anxiety if his conclusions warranted him in so doing. But he did not say a word, and this seemed to point to inferences on his part similar to my own.

I was sensitive to the verge of timorousness. It was my duty to overcome this, and I kept my head from under the roof that I might distract my mind with such view as might be had of the passing landscape.

There was little to be seen at first save the lurid glare that still proclaimed the destruction of our belongings. The river had spread to a breadth of a quarter-mile. Its current was now as sluggish as it had been turbulent.

The banks were low on either side—the edge of extensive farm lands—but, low down in the boat, I could not see over them.

Father used his pole very gently to push the boat faster than the current would have taken it unaided, not daring to work with vigor lest an accidental splash might arouse those ashore.

Presently I made out the upper part of a house silhouetted against the sky on the southern bank. I knew it well. One of our tenant farmers lived there. He was a Christian, as were all the members of his family.

I stood up that I might bring my eyes to the level of the ground-floor windows. All was dark there. It was too early for the Chinese, under ordinary circumstances, to be asleep, and it was not to be supposed that Han Li and his family had gone peacefully to bed on such an evening.

I wondered if they had ventured to go to some hilltop near our house and watch its destruction, or if they were cowering behind their barred doors, awaiting the storm to overwhelm them, or if they had fled to the mountains

Vain wonderment! I never learned whether the Han family fell victims to the Boxers' fury or whether by some miracle they escaped.

This house was at the very edge of the village.

As we slowly rounded a bend in the river all Shanshan was in view. It was dark in the village also. Not a solitary window gleamed to punctuate the black monotony. For so much as the ear could tell, no life was stirring save as now and again a dog yelped dismally.

Above the general array of buildings the roof of the Yamen rose prominent. Dark there, too.

The *taotai*, corruptionist as we knew him to be, cowardly and treacherous as we suspected, may have been at that moment shivering in his innermost chamber, dreading on the one hand that the Boxers might fall upon him as the representative of the government they hated, because it suffered the presence of foreigners, and apprehensive lest his inability to check the outrages in his own district should bring upon him the severest punishment that the central government could inflict.

Well he knew that if the foreign ministers in Peking ever succeeded in arousing the Palace to a sense of its responsibilities, insignificant underlings like himself would be sacrificed ruthlessly to demonstrate the sincerity of the government.

For one brief period while we were passing the village a house stood directly between us and the fierce glow of our burning home.

Distinctly outlined against the lurid background I saw not less than a dozen persons on the flat roof.

All had their faces turned toward the

fire. Though they moved a little, they did not look our way.

Had they done so, it is more than doubtful if they could have distinguished our boat from the general darkness, for here the entire width of the river was in shadow.

Thus we passed Shanshan, thus I looked for the last time upon the town I had called home for ten happy years. I saw its buildings mingle into night's obscurity with profound relief and thankfulness, for it had seemed to me that this first stage in our journey would be the most fraught with peril.

Once we were well away from the village, Edward took a pole, and both men worked as effectively as possible to speed our progress.

"How far do you expect to go tonight, Edward?" I asked, taking it for granted that for the present at least we would be in hiding all day.

"I do not venture to expect anything, Jannie," he answered, and there was a note in his voice that troubled me.

I wished I had not spoken. I had done so merely for the sake of breaking the wearing monotony. I had asked what seemed to me the simplest, most commonplace question, and the answer left me more uncomfortable than I had been before. I sat down again with a sigh.

"Better come inside, dear, and lie down," mother suggested. "You may need all your strength, and you can be of no use there."

"I cannot lie down," I answered; "I must see what is going on."

She made no protest. I sat on one of the bags, so that my eyes were just above the arched roof, and watched my lover. After a time he laid aside his pole and resumed his station forward, for we had come to a short stretch where the river, flowing between low hills, was narrower and more rapid.

The current itself took us as swiftly as it was safe to travel in the darkness.

Some minutes passed in silence. We had just emerged from the narrows and were entering another broader and sluggish expanse, when Edward made a gesture to father indicating that he wished the boat to be steered a little aside from the straight course. At the same time he reached for the hook.

Under its headway the boat swung about readily to the crude helm. Edward reached forth the hook and caught it in something which he pulled alongside.

Kneeling, he raised it partly from the water, and through the gloom I caught the ghastly glimmer of a human face.

Edward bent close to it for a moment and let it drop. There was a subdued rippling as it sank beneath the surface. Edward replaced the hook and resumed his former attitude.

Father, who must have seen as much as I did, said nothing. I could not frame the question I longed to ask. But why should I ask it?

If it had been the dead face of Tsing Lao that Edward drew from the river he would have told me.

The gruesome incident did not induce me to join my mother under the roof. With all its possible horrors, I preferred to see the journey we were making rather than endure it in the dark.

I had the semblance of taking an active share in the adventure when I could see what happened to my father and Edward.

Edward soon took up the pole again, but before he came aft to use it he stood for a moment looking forward.

All along the banks there was a growth of bushes as high, perhaps, as a man's head, but there were no trees to throw the middle part of the river in shadow. As the sky was perfectly clear it was possible to discern objects on the surface at considerable distance

"Do you see something ahead there?" asked Edward, in a low voice, as he came aft.

"Yes," replied father; "I presume we are overtaking some of the wreckage of the bridge."

"Probably so; but have you observed no movement?"

"Movement! No; have you?"

"I cannot be sure. You look, Jannie. Do you see anything?"

"Yes," I said. "I saw it, I think, as soon as you did."

"And you noticed nothing moving?"

"Nothing, Edward."

"I presume I was mistaken, then. I've been straining my eyes so that my

nose seems to dance at times. But let us go closer. I can't be satisfied without investigation."

The conversation was conducted so softly that I doubt if anybody at the forward end of the boat could have heard us. When the men poled they exercised the most extraordinary precaution to avoid noise. I kept my eyes narrowly on the object that interested us, but could see no motion of any kind.

Edward stopped poling as we drew near the object, and went forward with pole in one hand and hook in the other.

The object proved to be a large section of the bridge flooring. When we came alongside, Edward suddenly dropped the hook, leaped on the floating wreckage, and began jabbing the water vigorously on the farther side with his pole.

I watched in amazement. Father silently thrust his pole hard into the bottom to hold the boat.

Again and again Edward stabbed the stream with his long pole -now here, now there, working with seemingly insane fury.

At length he desisted, and with movements that indicated reluctance and disappointment, he returned to the boat.

"I suppose you think me a more or less inspired idiot," he said, "and wonder what can have possessed me."

"It's an easy guess," father responded, "that you saw a man drop from the wreckage into the water. Could you feel your pole come in contact with anything that seemed human?"

"No; the most I have accomplished was the punching of several holes in the mud from which sediment may rise to choke the fellow who is swimming about beneath the surface."

"Are you sure, Edward?" I asked. "I could see nobody—"

"And I have seen nobody," he interrupted; "unless my eyes did not deceive me when first we sighted the wreckage. Then I thought I saw a man rise and immediately stoop or lie flat again. From that time I could distinguish no movement.

"Just as we got abreast of the wreckage I made out some ripples that centered close to the fragment on the farther side. The rest of the river surface was like glass, save for the wake we made. I suppose you guess my inference. A man had been on that wreckage. When he heard or saw us coming he rolled off into the water, trusting to escape observation by keeping himself wholly submerged except his face and fingertips.

"He had to let go and sink when it became apparent to him that we were going to examine the wreckage. As his head went under the ripples formed. I hoped to hit him with the pole and compel him to rise, but I didn't touch him."

"Edward," said I, to whom this theorizing appealed as demonstrated truth, "who was it?"

"All guesswork," he responded.

"But who do you guess, then?"

"I don't guess."

"It might have been a native Christian making his escape," suggested father.

Was he ironical? I thought so. Edward muttered "Humph!" incredulously adding quickly, "I was probably mistaken."

"The ripples could have been made by the diving of a muskrat," said father.

"A muskrat would have made a splash," retorted Edward. "Why argue about it? We can't settle it, and I don't see that it's important now that we are by the thing."

His indifference to the matter was palpably insincere. I knew that his mind had been deeply impressed. If not, why should he stand looking intently back at the water all through the discussion?

He was hoping to see the man come to the surface!

CHAPTER VI.

The Foe Unseen.

NOT more than five minutes passed when I was disturbed by a sound on the shore at our right.

"Father!" I whispered. "Edward, be still a moment."

The light plashing of their poles and the rustling of their garments—faint noises, but distinct in the night—ceased at once and they listened

I was sure that I heard rapid footfalls behind the fringe of bushes along the margin. A second or so after the

poling stopped, so also did the sounds from on shore.

"What is it, Jannie?" asked father, after a long pause.

"Did you hear anything?" I asked.

"Nothing at all. Did you, Ned?"

"I think not. What was it like, Jannie?"

"As if somebody was running rapidly and softly."

They listened again, but heard nothing. Neither did I.

"Overstrained nerves, I guess, Jannie," said father, resuming his work.

"Unusually sensitive nerves, I'll admit," I responded; "but not strained to the point of hearing things that don't exist."

Edward had not begun work again Letting his pole drag, he stooped beside me

"Did you hear it," he asked, "when we were still?"

"No, I did not; but I did before—something, Edward. What it was I don't presume to say, but you asked me what it was like, and I told you."

"Listen again."

"I am listening all the time, Edward."

"Do you hear anything now?"

There were long pauses between our whispers.

"I can hear only father poling," I admitted at length.

"Which doesn't prove that you heard nothing before. Keep your ears pricked up, Jannie, and let us know if anything else impresses you."

I pressed his hand gratefully. In truth, I had been a little hurt by father's incredulity, owing, without doubt, to the discontenting fact that I had to sit there, a useless do-nothing, when I was so eager to bear an active part.

It was encouraging that Edward did not discredit my senses. I was again grateful as I observed how carefully he worked to avoid making a noise.

"Stop!" I commanded a moment later.

Edward dragged his pole immediately. Father was a little slower about it, but nevertheless we all heard distinctly the *pat-pat-pat* behind the bushes that had first disturbed me.

The noise continued until perhaps a dozen steps had been taken. Then, with a dry, sharp "crack," as if a foot had broken a dead twig, they stopped abruptly.

"Now," I said, "what do you think?"

"A gazelle trotting to its watering place somewhere down the river," suggested father.

"I am glad you observe," I retorted, "that it is going down-stream."

"Well," he said, "we mustn't be impatient of one another. What do you make of it, Jannie?"

"No animal, father; nothing less than a human being."

He was silent. After we had listened a moment, I asked: "Don't you really think so yourself?"

"I must say I do," he answered slowly; "but I can't see what we are to do. It doesn't follow that the person back there is interested in us."

"That's about it, Jannie," Edward began, but I interrupted him.

"You are both trying to relieve my apprehensions," I said. "I thought we had agreed that that was not to be done."

"But there's no use cherishing anxieties, Jannie, from which no good can come," said Edward. "I admit that I don't exactly enjoy those sounds. What can we do? What ought we to do?"

"You have been a good reasoner thus far, Edward," I replied, "and I have every cause for acknowledging that good comes from your guesswork, as you call it. Let me take my turn at reasoning, and then see if you can make anything of it that may either be turned to our advantage or dissipate our anxieties."

"By all means go ahead. What do you think?"

"Begin at the wreckage from which you think you saw a man roll into the water. Grant that you were not mistaken. It follows that the man was hostile to us, does it not?"

"I shouldn't have jabbed at him so viciously if I hadn't thought so. But think it out in your own way, Jannie."

"It is clear that he clung to his raft long enough to perceive that the men on this boat were not Chinese, for in the darkness he could distinguish the characteristic garments of the foreigner.

"If he had not been hostile he would not have disappeared. Grant that he was afraid of us; he was hostile, nevertheless. Would it not be possible for a man to swim under water until we had

floated so far away that his nose could not be seen when he had to come up to breathe?"

"Entirely possible. I thought of it at the time."

"And after we had got still farther away he could swim to the shore without our knowledge. Then, what more reasonable than an enemy, having discovered our escape, should try to head us off? That man behind the bushes, Edward, is the man who dropped beneath the surface when we approached. He has overtaken us. When first I heard him he was not quite abreast of the stern. He stopped a little ahead of us."

"It is good reasoning, Jannie."

"And the land ahead is full of our enemies. Chien-loo cannot be so far away—"

I stopped and caught Edward convulsively by the arm. The steps had begun again.

The sounds started a creepy fear. More nerve-racking were they than had been the sight of Tsing Lao when he pressed his brutal face close to mine and sought to bear me away.

They were now alongside, showing that the man had halted when he stepped on the dry twig, for we had been floating gently with the current.

Pat-pat they went, and the caution was as manifest as if we had seen him lifting his feet and putting them down.

Edward made a light splash with his pole, and the footfalls ceased again.

"Steer directly to the shore," he whispered.

"All right," father responded.

We went very slowly, for we had little headway, the boat's prow turned to the bank. Meantime, Edward crawled under the bamboo arch and out again. He brought a cup, a part of the culinary outfit of the men who were accustomed to taking the boat to market.

We were about fifty feet from shore when the rustling of foliage indicated that the man was making some sort of movement. Perhaps he had parted the branches at the water's edge to look out on the river, and perhaps he had simply started on again.

Edward hurled the cup with all his might straight toward the sound. We heard the missile crash through the foliage and drop to the ground, and simultaneously the unseen man set off on a run.

The footfalls were extremely rapid now, and taken with no precaution to avoid noise. We listened to them until they died away altogether.

"Well," said Edward, picking up his pole, "he knows that he was discovered, and that's something. I would have liked to go ashore and fight it out, but he would have had a good start while I was breaking through the bushes, and I shouldn't have dared to use my revolver for fear of stirring up a swarm of the pests."

"What will he do, do you think?" asked father.

"I don't know, Mr. Warren. I hope he has been badly frightened. That's the next best thing to disabling him physically."

"I suppose you think of the possibility that he may carry word to the Boxers around Chien-loo?"

"Indeed, I do, but what will the Boxers have to do in Chien-loo after the destruction of the village?"

"Only a part of the inhabitants were Christian."

"I know, but isn't it likely that the Boxers, having done their work, would move off to some other place? Your house, for example."

"I doubt if the Chien-loo Boxers could have got to my house in time to take part in the attack, and there are no other foreigners in this part of the province."

"Well," said Edward desperately, "we are between Scylla and Charybdis. There are Boxers behind us that we know about. There are probably Boxers in front of us. To go back is certain death. To go forward is simply dangerous. We've got to pass Chien-loo tonight. I prefer to take the risk."

"Oh, there's no difference of opinion on that," responded father. "We must go ahead. The only question concerns methods. This fellow, now openly running away from us, would have gone on in any case. I agree with you that it is well that he has been made to understand that we are aware of his activity. We've got one big advantage: the Boxers evidently are not provided with firearms."

"I have heard that some bands are

well armed, but those hereabout seem to have only knives and agricultural implements. I did not go to Chien-loo when I visited you last summer. Does the river run straight through the town?"

"Beside it, as at Shanshan. Chien-loo is a smaller village."

"That is hopeful. There will be comparatively few boats for pursuers. Does the river bend in passing the village? Is the current swift or slow? What is the nature of the opposite bank? Tell me all you can about it."

"The river is straight there, bending a little to the north after passing the village. It is about three hundred yards wide and very slow. The utmost extent of the wharfage is not more than a quarter of a mile. The opposite bank is lined with trees."

"That's promising and hopeful," said Edward. "Let us suppose that the worst happens, that this unseen foe carries word to the Boxers in Chien-loo that we are coming. Suppose they gather at the wharfs to watch for us. It is possible that we could slip by in the shadow of the trees on the opposite bank. Certainly it would be difficult to distinguish the boat moving as far as three hundred yards away, and if we are discovered—why, we can fight for it."

"Edward," I said, "if it comes to a battle, you won't condemn me to be idle, will you?"

"I wouldn't," he answered, "but you must ask your father. He's commander in chief."

"I wasn't aware of my commission," said father; "but if you refer it to me I say at once that all who can fight must do so. Jannie has done some very pretty target practise with a revolver, and if she wouldn't shrink—"

"Oh, father!" I interrupted; "shrink, at such a time? Can you think I would?"

"No, I believe you'd do well. I was going to say that we have plenty of weapons to keep three of us busy firing, and your mother could load for us."

"One of us would have to pole," suggested Edward.

"I think," father responded, "that I could manage the pole and yet get in a shot occasionally."

Thus we discussed the emergency we were approaching, planning the details of the conflict so far as we could without knowledge of what the enemy's tactics would be. Edward asked how far we were from Chien-loo. When father told him it was about two miles, he advised that the boat be pushed to the utmost in order to give the enemy the least time for preparation. He asked me to get all the weapons together and lay them where they could be reached readily.

I did so, placing the revolvers upon a bag beside me and putting the cartridge boxes where mother could handle them readily. She, dear soul, did not even tremble during these portentous preparations, asking simply to be instructed exactly as to what would be expected of her.

For myself, I almost longed for the conflict. Certainly I was more satisfied than I had been at any time since the flight began, for at last I was actively concerned in our operations.

We worked quickly, mother and I, while the men poled so hard that there was a constant singing of ripples as the boat sped in the darkness, and all too soon there was nothing to do but wait.

Another dreadful period of suspense set in. It could last but a few minutes, but every second was heavy with uneasiness.

"I wish I could take a pole, too," said I.

"You cannot," father responded; "it would hinder rather than help us."

We were then skirting the southern bank, having held close to it since the flight of the unseen foe. Just ahead of us the river bent sharply to the south.

"When we have rounded that bend," said father to Edward, "we will cross to the other bank. Then you'd better let me do the poling while you watch and stand ready to open fire, if we have to resort to that."

Edward indicated that he understood and agreed. Both were giving their whole attention to poling, with only glances ahead to see that we kept our course.

We had begun to round the bend, when the boat jarred, much as it had done when we fouled the submerged roof of the house-boat.

"Push off!" said father sharply. "We have kept too close inshore."

Both thrust their poles into the water on the land side and shoved hard. The craft promptly drew away from the bank, but the jarring continued, accompanied by a low but sharp noise, like a continued scratching

"We're scraping over a rock, and a big one," exclaimed father under his breath.

"I don't touch it with my pole," said Edward

"Because we're stuck on it," father exclaimed. "You and Jane go forward. Maybe your weight will bring this end up."

"We're not stuck on it." Edward protested, while nevertheless he obeyed; "the boat is floating steadily away from the shore."

"Then it's a water-soaked log," said father. "We've got to get clear of it in any case."

Edward swept his pole through the water along the side of the boat, and it came in contact with nothing. The jarring and scratching, however, ceased.

"It's all right," said father; "you may come back."

We heard an exclamation from mother.

"Will," she said, "the bottom of the boat is covered with water! It seems to be coming in fast."

"We've sprung aleak, Ned," said he.

While Edward stooped to crawl under the arched roof I stood beside him, looking down. A splash and a gasp at a little distance caused me to raise my head and I caught Edward by the arm.

"See!" I whispered.

He looked up, as did father, and we saw a man's head on the surface of the water not more, it seemed, than twenty feet behind us. The head disappeared almost as soon as we spied it.

"Oh!" groaned Edward; "if I dared risk the sound of a pistol-shot!"

That would have been suicidal, and we all knew it. Moreover, it was only too apparent that the condition of the boat demanded immediate attention.

"Better come out, Mrs. Warren," said Edward, as soon as he began to investigate.

Mother came out from under the arch. Edward went in, feeling along the bottom of the boat with his hands.

"Jannie," he called presently.

I was kneeling before the opening. He handed me a dish.

"Bail," he said imperatively; "bail for all you are worth."

"Can you find another dish, Edward?" asked mother

For reply he handed one to her, and we both set to work, dipping up the water and throwing it overboard

Father continued to pole.

"I've found it!" said Edward, after a moment. "The fiend! He's cut a piece out of the bottom of the boat as big as my hand"

"Do you mean," asked mother, "that it was a man swimming under water that we ran against?"

"Nothing else," he replied, "except that the man ran against us. It was your friend of the footsteps, Jannie. Your reasoning was correct; but who would have dreamed that he would get ahead of us for the sake of this scheme?"

"Then it was your friend of the wreckage," I responded; "and nothing can persuade me that it was not Tsing Lao."

"I believe it," said he. "Oh, for a fair sight of him within pistol range!"

While he was speaking he was working busily, just how we could not tell.

"What's the prospect, Ned?" asked father

"Bad," he answered: "I'm trying to stop it with towels. Perhaps I can jam my coat in so that it will stay. These small cloths are forced out, no matter how I fix them."

Off came his coat, and we could see him crowding it into the hole. "How are you making it, Mrs. Warren?" he asked, after a moment.

"It gains on us," mother replied "We are bailing as fast as we can."

Edward lifted off a section of the arched roof and laid it over the next section forward. Then he, too, took a dish and helped bail.

The combined efforts of three reduced the water perceptibly, but it was plain that the leak was by no means stopped.

Edward said he could feel it oozing

through his coat. He knelt on it to crowd the fabric closer against the wood. This device had some effect, perhaps, but still the water entered.

"Maybe there's more than one hole," I suggested.

"I've thought of that," he replied. "I can find none, but he might easily have made several slits in the soft wood with a knife that was sharp enough to gouge a hole out like this, and water would come in through every such slit."

He gave a comprehensive glance around. We were in midstream, and father was poling us slowly toward the northern bank.

"There's nothing to do, I suppose," said father, "but go ahead as we planned."

"It's the one thing we can't do," replied Edward

"Is the leak as bad as that?"

"Yes. If we were going down the river in a time of peace we could manage, perhaps, to keep ourselves afloat as long as the ladies could stand the effort of constant bailing, but when it comes to passing Chien-loo, it's not to be thought of.

"While we were fighting a battle the boat would sink. If we kept the boat afloat we'd be overwhelmed. We mustn't risk passing the village if we're not in shape to fight."

"Well, then?" and father's tone of inquiry was as calm apparently as if it were merely a question of a little inconvenience.

"Make for the other shore," said Edward.

"The southern?"

"Yes; we don't want the river between us and our goal."

"I dislike to argue at such a crisis," said father, while he nevertheless began to swing the boat around as Edward directed; "but we are almost in sight of Chien-loo. That rendezvous of the Boxers is on the southern shore."

"We cannot get ashore too quickly. If I had realized how serious this leak is I should have advised that move at the beginning. Of course, Mr. Warren, if you have any definite plan that involves disembarking upon the north bank, I will yield without question. We are compelled to abandon the boat in any event."

"I have no plan," said father, "and I take it for granted that you have."

"Yes, one that is overburdened with 'ifs'; but a possible plan just the same. You haven't forgotten Wu, I suppose?"

"By no means. I have supposed that he figured somehow in your operations."

"Decidedly. I haven't told you all about it, partly because there has been no proper opportunity, and more because the plan was so extensive that I feared you would object to it as impracticable. You would have been justified, you see, by this calamity which has occurred early in the undertaking," he said.

"In spite of the calamity, Ned, it has been a good plan thus far. Wu accomplished at least a part of what you laid out for him. It's fair to presume that he will do the rest," said father.

"I think he will, and if he does he will be waiting for us to-morrow at a point south of the Great Wall with horses, and possibly a bodyguard."

"Then we must try to connect with Wu," father continued.

"That's the program, Mr. Warren, and if we could have held to the boat I believe we should have made it. Now we've got to try a land journey and dodge the enemy at every step. It will be physically arduous for the ladies."

"You mustn't think of that, Ned," said mother: "we shall know that whatever difficulties are imposed upon us are necessary to our very existence."

The boat was nearing the southern bank, and meantime we had not ceased our bailing.

"Let us keep still," said Edward; "the boat will not sink before we come to land, and we must be sure that we are not running into an ambush."

We laid aside our dishes and father dragged his pole. We heard nothing

Presently the boat grated on the shallow bottom. Edward let himself over the side and dragged, while father pushed, until the prow had been forced far in among the bushes.

"Stay where you are a bit, while I reconnoiter," whispered Edward, and with a revolver in his hand he left us in the darkness.

(To be continued.)

On the Editorial Carpet

**There's a Long Line at the Ticket Window,
So Get Your Pasteboard Early for August.**

RUNNING ON THE NEW DIVISION

PASS the high-ball to THE RAILROAD AND CURRENT MECHANICS! She's out on the main line to make another record! She's going to set up a new mark as the liveliest, most entertaining magazine in the world! The old Johnson bar is hooked up for a short cut-off, and we are working a full head of putty.

The magazine is more interesting and attractive, we think; but if you don't think so we want you to tell us in the same straight-from-the-shoulder talk that we hand out to you when we have anything to say.

This number is only a hint, remember, of the big things that we will take aboard farther up the line. The Current Mechanics department will be more attractive every month, and we will carry always the same full tonnage of good old railroad literature.

We want you to thoroughly understand the purpose of our new department Current Mechanics. In this department we will illustrate and describe in easy-to-read English the latest and most wonderful inventions, the newest machinery—like the great elevator-crane which forms the front page of this month's cover, which picks up a car containing sixty tons of coal and dumps it as easily and as quickly as you would dump a shovelful.

We are going to give you all that is new, labor-saving, and helpful in the improvements of the household, where women have done so much to lighten the most important work of the world—the work of keeping up the home.

We will give you the most unusual photographs of outdoor life and sports. Everything we publish in this department, as well as in the rest of the magazine, will be fully explained. One of the chief objects is to make it simple and comprehensive, as well as educational. Current Mechanics will be an education in itself. It will be alive with human interest. It will set facts irresistibly before you.

Too many people "see" things without really knowing what they see. All around us are wonderful machines and marvelous inventions, the inner workings of which are absolutely unknown to the lay mind. For too long a time these ingenious devices of mental skill have been regarded with indifference. Current Mechanics will set all these wonders before you so that you will understand exactly what they are and how they operate.

There are dozens of things in this number that some of our readers have never seen before; dozens of things about which they previously knew nothing. Our pages render these subjects absolutely clear and comprehensible.

Remember this: nobody is going to raise the board against the railroad. This is still the railroad man's magazine with a bigger, broader policy, and new

features to make it better and more entertaining. Our literary freight-house is loaded with shipments of fine fiction and special articles, and when the new department hits its real pace we know you will be tooting the whistle for the magazine louder than ever before.

Every reader of THE RAILROAD AND CURRENT MECHANICS has a big chance to become a paid contributor to its pages. Scattered through the new department are little notices that tell you just what we want. It has a big field to cover, and we cannot have too many clever people working for us.

However, we have already asked for your unbiased opinion regarding the change. We hope you will not fail to let us have it when you have had a chance to look the magazine over thoroughly.

MUST GIVE IT UP.

EDITOR, THE RAILROAD & CURRENT MECHANICS:

IT is with regret that I cannot fill out to my satisfaction the white blank which came in the April number of your magazine. If I could, I would insert ten years instead of one year for the length of the subscription; but the fact is that the magazine and high-school work do not agreeably go together.

In my case I would not care if school kept at all if I had your magazine and nothing to do; but it don't happen to be that way.

I am expected to accomplish something in school, and it's certainly impossible for me to study and get anything out of it when your magazine is lying near with its abundance of interesting and exciting stories.

I have found myself yielding to temptation and laying aside my algebra to read your stories, which are far more interesting than knowing what 2 plus 2 happens to be.

So, of my own accord, I think it will be best for me to give up the most interesting magazine for a year or so until I do something that will not take up so much of my time as school work. Then I can sit back in my chair in the evenings and read to my heart's content your magazine, which, in my estimation, is the unsurpassed standard of all magazines now published.—J. O. H., Los Angeles, California.

AN OLD ROAD LOCATED.

EDITOR, THE RAILROAD & CURRENT MECHANICS:

REFERRING to the query of J. L. W., Barton, Florida, in the March number, the road he seeks is the Newcastle and Frenchtown Railroad, said to have been built in 1832 and running from Newcastle, Delaware, on the Chesapeake Bay, to Frenchtown, Maryland, also on the bay, or, perhaps, Elk River. About seven miles of its right-of-way was used by the Philadelphia, Baltimore and Washington from Newcastle to about one mile north of Porter, Delaware. There were, some years ago, and probably still remain, a few of the rails and ties in position at this point, having been left there to retain title to the right-of-way, and there may have been a station at this point, as the name "Rodney" designated the place for many years. Many old Delaware railroaders possess souvenirs of the old road in the shape of "scarfed" spikes and sections of the old U-rail with which it was laid. Passengers on the Delaware division trains may catch a glimpse of the old road-bed embankment stretching to the southwest as the train strikes the curve above Porter. I have never seen the Chesapeake terminus, but would like to know something of the road's history.—H. W. G., Vicksburg, Mississippi.

IN ECUADOR.

EDITOR, THE RAILROAD & CURRENT MECHANICS:

I AM sending you a copy of a telegraphic bulletin lately issued by the Guayaquil and Quito Railway Company. It may serve to show your readers what railroad employees have to contend with in this part of the world. Unhealthy conditions, however, are to be found only on the division between Guayaquil (Duran) and Bucay, which is commonly called the flat. Going from Bucay north on the mountain division, known generally as the "big hump," health conditions are very good.

Thanks to Colonel Gorgas, who lately paid us a visit, it is expected that a marked improvement will be made in the sanitary conditions of Guayaquil and vicinity.—T. H. S., Duran, Ecuador.

THE GUAYAQUIL AND QUITO RAILWAY COMPANY.

Jan. 3, 1913.

CONDRS.:

Effective to-day an extra third class car will be put on trains 12 and 16 for the purpose of handling bubonic and yellow fever cases. This car will go out on No. 11 daily and be set out at Barraganetal until further advised. Conductors will not allow persons suffering from these diseases to enter the cars on trains Nos. 2 and 8.

GOES ON FOREVER.

EDITOR, THE RAILROAD & CURRENT MECHANICS:

THOUGH never at any time a subscriber to your magazine, I have been a purchaser of it at the news-stands for a long time; in fact, almost from the first issue.

At the start I had an idea that the venture would not be a success. It seems, however, like the brook, to "go on forever." In fact, the magazine is getting better all the time.—F. B, Fort William, Ontario.

EDITOR, THE RAILROAD & CURRENT MECHANICS:

I KNOW the railroad that J. L. W. asks about in the March number. I have been over its right-of-way from Frenchtown to Newcastle. The road was built in 1831, and some claim that the first locomotives in the United States ran over it.—J. K. W., Philadelphia.

1410'S RECORD.

EDITOR, THE RAILROAD & CURRENT MECHANICS:

ENGINE 1410 runs between Newton and Dodge City. Its run is on No. 1 and No. 2. It went from Belpre to Hutchinson, a distance of 67 miles in 62 minutes, stopping at Partridge three minutes for orders and slowing up for the river bridge. It was in charge of Engineer Thomas and Fireman Lock.—W. J. A., Belpre, Kansas.

LADY WANTS SIGNS IN RULES.

EDITOR, THE RAILROAD & CURRENT MECHANICS:

IF possible, give us another article on the signals and signs used by railroad men. Why aren't all such signals in the Book of Rules?

Train 83, south-bound local, was holding main and was close on the time of No. 2, north-bound passenger. Dick, the engineer of the local, asked Fred, the conductor, if he should take water by throwing back his head, opening his mouth, and inserting his finger half a dozen times; or if he should head out—the signal being given by striking his hands against his forehead.

Fred shook his head and gave the signal to back down, head in, run down, cut loose, head out, back down, cross over, and take a drink. In that way the main would be clear for 2. The engine of 83 had plenty of time to drink, and the train would be at the south end of the passing track ready to pull out.

Of all the motions used by Fred, but two are in the Book of Rules: "back up" and "go ahead." The railroad man surely learns his signals at work, not by reading.

All the satisfaction I get in wanting to be an engineer is in reading the RAILROAD MAN'S MAGAZINE. MRS. H. J. J., Tontogany, Ohio.

J. B. KING IS LOCATED.

EDITOR, THE RAILROAD & CURRENT MECHANICS:

I AM J. B. King, all right—at least I enjoy that distinction. I am a namesake of ex-Senator Joe Blackburn. I was given that name longe ere Mr. Blackburn came into prominence. I am very sorry, but at present I have no photograph of myself, but will try to send you one later. Now please don't think me a "hobo" or "bum." I am *not*. However, I have traveled rather extensively and met a great many railroad people. I have made many friends, and it's my honest aim to keep them. There are hundreds, perhaps thousands, who would be delighted to see my picture and hear a word from me through your magazine.—J. B. KING, Garfield, Utah.

AUTOMATIC SAFETY STOPS.

EDITOR, THE RAILROAD & CURRENT MECHANICS:

I WISH to take exception to A. C., regarding automatic safety stops, in your May number. Taking up his objections in the order he presents them, I wish to say:

1.—The right kind of a safety stop would not complicate the locomotive to any detrimental extent. A. C. probably formed his views from the devices that have been publicly mentioned which, I admit, have a tendency to create a contrary impression.

2.—The right kind of a safety stop would not entail enormous expense. I know of a device so simple that it would be very cheap, and if it served to prevent one wreck it would more than pay for the expense of installation. The expense of maintenance on locomotive would be very small, and the expense of maintenance of signal device would be no more than the signal appliances.

3.—Competent engineers should not resent a device that is primarily intended to assist them when conditions are against them.

4.—It is true that railroads have learned by bitter experience to be wary of a man with a novelty to sell. However, this, while regrettable, does not destroy the merit of a practical safety stop nor explain away the sad need of such a device. This opens up a vast field of thought, discussion, and development which your space and my time will not now permit me to enter.

5.—The fact that the maintenance of the appliances would have to depend upon human agency which might fail is no argument. If it were, it could be applied to manual, automatic signals and all other safety appliances already in use. I do not advocate the elimination of the human element, but propose to overcome the element of human weakness.—W. M. S., Osawatomie, Kansas.

"13" IS NOT UNLUCKY.

THE predilection for odd numbers is very ancient and is mentioned by Virgil in his "Eight Eclogue," where many spells and charms, still practised at that time, are cited. In this work the number 13 is referred to as being very ominous, but the reasons are not given. In an old English book reference is made to the following anecdote:

A covetous courier complained to King Edward VI that there was good foundation for the feeling regarding a master and twelve

fellows of Christ College, Cambridge, and advised the king to take away one or two fellowships so as to destroy that portentous number, 13

"I have a better way than that," said the king, "I will add a thirteenth fellowship unto them!"

This he did, and so it remains to this day

The origin of the singular fancy on the fatal influence of 13 is unknown. Many trace it to the Lord's Supper, but that event was foretold in the Old Testament. The events arising from it were foreordained, therefore they did not occur in consequence of thirteen sitting at table.

The number 13 was of tremendous importance in early biblical times when law stones in Aaron's breast-plate, 12 gates of Jerusalem, 12 months of the year, and 12 signs of the Zodiac, making in every instance the number 13

The jury of 12 was adopted because the number of prophets was 12; and the number 12 apostles, 12 Jewish judges, 12 pillars to the temple, 12 patriarchs, 12 tribes of Israel, 12 were formulated. There were 12 prophets, 13—unless the presiding judge counts for nobody—has held sway always over the protection of life, liberty, and property. All of these sacred rights were not so entrusted because the number was viewed with suspicion, but as one commanding the highest confidence of thinking people

The number 13 has a peculiarly happy and lucky significance to all Americans, who should feel a patriotic glow when the number is mentioned, for 13 colonies joined hearts and hands in one grand cause and with this cabalistic number gave us the liberties we now enjoy. "Old Glory" contained 13 stars and 13 stripes. Neither have lost their luster

More remarkable than 13 is the supposedly evil day, Friday, in the history of this great country

Christopher Columbus sailed on his voyage of discovery on Friday, August 21, 1492.

Friday, October 12, he discovered land.

Friday, November 22, 1493, he arrived at Hespanola

Friday, January 4, 1494, he embarked on his second voyage.

Friday, June 13, 1494, he discovered America.

Friday, March 6, 1496, England's Henry VIII gave to John Cabot his commission which led to the discovery of North America

Friday, November 10, 1620, the Pilgrims made the harbor of Provincetown. On the same day they signed that august compact which was the forerunner of our Constitution

Friday, December 22, 1620, the Pilgrims made their final landing at Plymouth Rock

George Washington was born Friday, February 22, 1732

The Declaration of Independence was signed on Friday, July 4, 1776.

With such an array of facts and figures, one wonders how the popular belief in the fatal influence of days or numbers can still survive, especially among railroad men, who, as a rule, ripen into men of broad minds because of their large and varied experience Remember the old Greek adage, "Beware of the man with one sandal," meaning the man with one idea, *the man who makes but one track as he passes through the world*

Why should Friday and the number 13 be more calamitous than any other day or number? It is not, as will be shown by the following record of railway accidents in Great Britain during twenty years:

1885—Aug. 24, 26. Sept. 21. Dec. 8. 1886—July 22, Dec. 26, Dec. 26. 1887—Feb. 14, March 2, Oct. 7, Nov. 13, Dec. 31. 1888—Jan. 3, March 19, April 28, July 20, Sept. —, Dec. 1. 1889—Jan. 21, 28, Feb. 12, 23, May 13, July 13, Oct. 15, Dec. 18. 1890—Feb. 5, April 30, Nov. 25, 30. 1891—June 2, Oct. 17, Dec. 26. 1892—Jan. 21, Nov. 6. 1893—May 22. 1894—July 23. 1895—Feb. 28, April 5, April 13. 1896—Aug. 28. 1897—Sept. 1. 1898—March 6, April 10, May 11, Oct. 31, Nov. 11. 1899—Sept. 26, Dec. 23. 1900—Nov. 15, 23. 1901—Oct. 4. 1903—July 15. 1904—July 5, Oct. 3.

No attempt has been made to enter fully into this chronology of fatalities in Great Britain during two decades, although complete records are on file and can be consulted by any one. The point is that during a period of twenty years only four accidents occurred on the thirteenth day of the month; that an equal number occurred on other dates, and a larger number on some dates.

So far the record of collisions and other railway accidents in our country, as tabulated by the Interstate Commerce Commission for the first three months in the year 1912, show the 15th to have been an ominous date:

Collision.	Salt Lake City,	January 1,	1912.
	New Castle, Pennsylvania,	" 15	"
	Long Run Kentucky,	" 16	
	Jonesboro, Georgia,	" 18	
	Kinmudy Illinois,	" 22,	
	Leesburg Illinois	26	
"	Dry Branch Virginia	February 9	
Derailment	Warren Bridge, Pennsylvania,	" 15	
	Cuprum, Utah,	" 15	
	N. Yarmouth, Maine,	" 15	
Collision	Larivill, Indiana,	" 17	
"	North Adams, Massachusetts	20	
"	Rutledge, Georgia,	March 8,	
Accident.	Green Castle, Indiana,	" 12.	
"	Galena Illinois		
"	Fortville, Indiana,	" 22,	"
"	Wrencoe,	" 25,	"

It will be noted that while one casualty occurred on the 13th, four occurred on the 15th. The Titanic disaster occurred on April 15, and, therefore, those who formerly believed 13 unlucky, are now inclined to think 15 a malific number!

However, nothing is escaping the searchlight of investigation these days, and even the most credulous person will admit that the stupendous events in history are due to man's wonderful ingenuity and inventive genius. It will be through man's genius *only* that casu-

alities will become impossible. The minds that are capable of creating the marvels of railroading are equally capable of inventing means for the prevention of railroad fatalities, irrespective of "the day of the month or the time of the year."

Lucky would be the baseball magnate who could secure for his baseball team those players who happen to have been born on the alleged unlucky date of the 13th. By the middle of the season he would be making preparations, probably, to enlarge the seating capacity of his park. Judging from the players whose birthdays fall on the hoodoo date, a world's championship combination could be picked.

The manager of this Thirteen club would be J. Garland Stahl, of the Red Sox. He was born on April 13, 1880. Presuming that Stahl might prefer to remain where he now is, a person named Fielder Jones, who was born on August 13, 1874, might be induced to take charge.

For scouts, Billy Murray, of the Pirates, who was born on April 13, 1864, and Gene McCann, formerly with the Highlanders, who was born on June 13, 1876, would be available.

The catchers for the Thirteen club would be Jimmy Archer, of the Cubs, and Mike Simon, of the Pirates. These two athletes reached this sphere on May 13, 1883, and April 13, 1883, respectively. Johnny Kling, who says he will not pastime this year, was born on November 13, 1885.

Only one real high-grade major league pitcher was born on the 13th. He is Vean Gregg, of the Naps, who will celebrate his twenty-eighth birthday next month. Bill Donovan, who pitched the Tigers to two pennants, and Rube Waddell, who was responsible for the winning of a pair of flags by the Athletics, were both born on the 13th. "Wild Bill" will be thirty-seven years old next October, and so will the Rube.

Noted infielders who celebrate their natal days on the 13th are, besides Jake Stahl, Hal Chase, of the Highlanders; Ed Konetchy, of the Cardinals; Larry Gardner, of the Red Sox; Eddie Foster, of the Nationals, and J. Franklin Baker, of the Athletics, who ran Tris Speaker a close race for the Chalmers American League trophy car last season.

The outfielders born on the 13th are not numerous. Josh Devore, of the Giants, was born on November 13, 1887, and Harl Maggert, formerly with the Athletics, was born on February 13, 1883. "Bucky" Freeman, who holds the major league record for the greatest number of home runs in a season, first saw the light of day on October 13, 1871.

Mal Eason, National League umpire, is one of the thirteen chaps, he having reached this earth on March 13, 1870. Here is the Thirteen club:

Manager and first-baseman—Jake Stahl, Red Sox; born April 13, 1880.

Pitcher—Vean Gregg, Naps; born April 13, 1885.

Catcher—Jimmy Archer, Cubs; born May 13, 1883.

First-baseman—Hal Chase, Highlanders; born February 13, 1883.

Third-baseman—Larry Gardner, Red Sox; born May 13, 1880.

Third baseman—J. Franklin Baker, Athletics; born March 13, 1886.

Shortstop—Eddie Foster, Senators; born February 13, 1888.

First-baseman—Ed. Konetchy, Cardinals; born September 13, 1885.

Right-fielder—Josh Devore, Giants; born November 13, 1887.

Scout—Billy Murray, Pirates; born April 13, 1864.

Umpire—Mal Eason, National League; born March 13, 1870.

ADDRESSES WANTED.

PRESENT address of John M. Deiry. In 1870 he lived at Coldwater, Michigan, and worked as telegraph-operator; in 1874 he worked for the T. W. and W. Railway, and after that for the W. St. L. and P. Railway. Any one knowing of his whereabouts kindly communicate with B. M. Bruening, Cashier, the Connecticut Mutual Life Insurance Company, Chemical Building, St. Louis, Missouri. Mr. Deiry has a paid-up policy in this company written for the benefit of his wife, Jennie L. Deiry, and issued in 1870.

Information is wanted regarding John F. Spencer, a trainman, who was last heard of in the employ of the Louisville and Nashville Railroad at Birmingham, Alabama. He is 5 feet 11 inches tall, weighs about 180 pounds, has dark hair, and is about thirty-five years old. Address Fred Spencer, 430 West Broadway, Louisville, Kentucky.

The present address of Foy Hermon Hamilton is wanted by his father, who is now living in Redoak, Iowa. Foy Hamilton is about thirty two years of age, 5 feet 7 inches in height, has light hair, and his nose has been broken. He started railroading about fifteen years ago. Any one knowing his whereabouts will please notify J. T. Hoggins, Butlerville, Indiana.

THE POETS' CORNER.

ON THE HUMMER.

BEEN on the hummer since ninety-four;
Last work I done for the Big Four;
Lost my office in the A. R. U.,
Won't get it back till 1922.

I've been out over the Texas plains;
Hit every super and master of trains;
Tried the I. G. and N. and the M. K. and T.,
And the Gulf Colorado and the Santa Fe

But I'm still on the hog train,
And flagging some meals,
And riding the brake-beams,
Close to the wheels

My clothes are ragged and full of stains;
And my long-tail coat's beating out my brains.
I wish I had my office back,
I would pay my debts and be a good shack

And now, trainmaster, I guess I'll go,
For I've told my little tale of woe;
It's a job I want—and I'm not in fun—
But I'll not refuse a piece of "mon"

So if you've nothing for me to do,
My little nut I'll prepare to screw;
With a happy heart I'll go my way,
And call again some other day

GOING THROUGH THE TUNNEL.

RIDING up from Bangor,
On the "Eastern" train,
From a six week's shooting
In the woods of Maine,
Quite extensive whiskers,
Beard, mustache as well,
Sat a "student fellow,"
Tall and fine and swell

Empty seat behind him,
No one at his side,
To a pleasant station
Now the train doth glide.
Enter aged couple,
Take the hinder seat;
Enter gentle maiden,
Beautiful, *petite*

Blushingly she falters,
"Is this seat engaged?"
(See the aged couple
Properly enraged).
Student quite ecstatic,
Sees her ticket's "through,"
Thinks of the long tunnel—
Thinks what he might do.

So they sit and chatter,
While the cinders fly,
Till that "student fellow"
Gets one in his eye;
And the gentle maiden
Quickly turns about—
"May I, if you please, sir,
Try to get it out?"

Happy "student fellow,"
Feels a dainty touch;
Hears a gentle whisper—
"Does it hurt you much?"
Fizz, ding dong! a moment
In the tunnel quite,
And a glorious darkness
Black as Egypt's night

Out into the daylight
Darts the "Eastern" train;
Student's beaver ruffled
Just the merest grain;
Maiden's hair is tumbled,
And there and then appeared
Cunning little earring
Caught in student's beard

THE AUTO FIRE ENGINE.

A Lament for the Vanished Fire Horses.

BY LOUIS J. WARREN, FIREMAN

"YES, things are changed, dog-gone the luck!"
Said the driver of Engine One,
"For they're goin' to fires with an auto-truck
And the horse is bounced and gone
It was sugar and oats and shiny coats
That were dappled and smooth and clean;
But now it's a lump in the driver's throat,
And a tankful of gasoline.

"There was a romance in a driver's work
And a something you loved right well;
It was snap of collar, a cry, a jerk,
Then off in the streets pell-mell
It was 'Steady, Joe,' and 'Come on, Bill';
It was sparks where the hoofs came down;
And many a time that they turned the trick
Of savin' a slice of the town.

"There was somethin' then in the stalls back there
That was human—or partly near;
Big eyes and a shiny coat of hair,
And a beast that a man held dear
As a lifelong friend—but the auto-truck
Is oustin' 'em slick and clean,
For oil and grease and a lot of muck
And a tankful of gasoline.

"Time was when Driver Tom could stand
And pet 'em and rub 'em down,
And feed 'em sugar outen his hand
Without the sign of a frown
But now it's a crank and a cling and a wheeze,
And a rattle, roar, and grind,
With a smell of gas to make you sneeze,
And a blue smoke out behind

"The march of science along the track—
I guess you might call it so;
But gi' me them old fire horses back,
Then see me hitch 'em and go!
For a horse was a human sort of thing
When he ran with that old machine;
But an auto-truck for a fire! By jing—
And a tankful of gasoline!"

Then he rubbed down its nickeled and varnished coat,
And he shined up its great glass eye;
He polished the brass with a lump in his throat
And a sorrowful, long-drawn sigh
He lifted the hood where its metal soul
Lay hidden and all unseen,
Then unscrewed a cap from a yawning hole
And fed it some gasoline

—*Englewood Press.*

Are you satisfied on pay day? When your pay envelope is handed you do you feel there's more than enough there to make both ends meet? In other words, does your salary grow with your needs?

Does Your Salary Grow With Your Needs?

Do you want to earn more? You ***CAN.*** Do you want to secure a better position? You ***CAN.*** Do you want to follow some line of work that really appeals to you? You ***CAN.*** In your own home and spare time do you want to acquire the training that will make all this possible? You ***CAN.***

The thing for ***you*** to do to learn ***how*** you can, is to mark the attached coupon and mail it today to the International Correspondence Schools. ***Without charging you a penny or placing you under any obligation*** the I. C. S. will explain just how you ***can*** become proficient in some ***chosen,*** well-paid occupation.

Thousands of other ambitious men have won success through I. C. S. help. Salary increases due to I. C. S. help are ***voluntarily*** reported at the rate of over 400 a month. The I. C. S. didn't care where these men lived, what they did, what they earned, what little schooling, cash, or spare time they had so long as they could ***read and write,*** and were ambitious, the I. C. S. way was open—just as it is open to ***you.***

Twenty-one years of unparalleled success in raising salaries proves the ability of the I. C. S. to make YOUR salary outgrow your needs. The first step is YOURS—mark and mail the coupon now.

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Box 1003, Scranton, Pa.

Please explain, without further obligation on my part, how I can qualify for the position, trade or profession before which I have marked X.

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R. R. Shop Foreman	Machine Designer
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R. R. Truck Foreman	Mining Engineer
Locomotive Engineer	Mine Foreman
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Air-Brake Inspector	Chemist
Air-Brake Repairman	Assayer
Mechanical Engineer	Architect
Mechanical Draftsman	Bookkeeper
R. R. Construction Eng.	Stenographer
Surveyor	Advertising Man
Civil Engineer	Automobile Running
Banking	Concrete Construction

Name .....

Employed by ..... R. F. D. .....

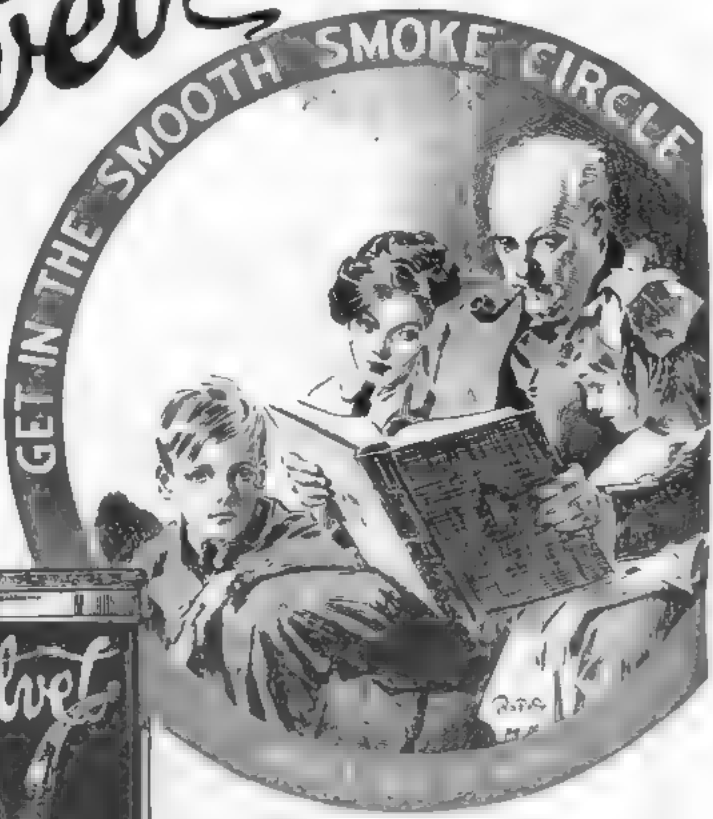
Present Occupation .....

Street and No. .....

City ..... State .....

Velvet

THE SMOOTHEST TOBACCO



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one pound glass
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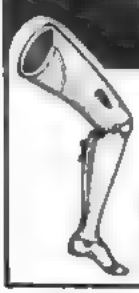

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WE GUARANTEE IN EVERY CASE a comfortable socket, easy ankle action, freedom from chafed parts, a cool stump, and all the qualities of good LIVE LIMBS made by skilled workmen of 25 years experience in the manufacturing of limbs and artificial appliances.

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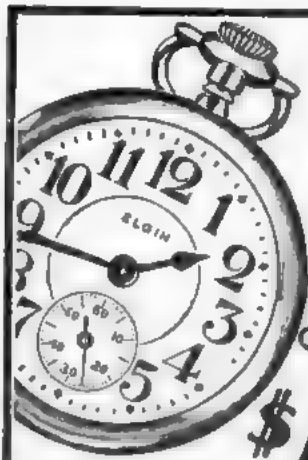
J. E. Hanger, Inc., 922 G Street, N. W., Washington, D. C.
or 1918 Olive Street, St. Louis, Mo.

Write Your Name on the Lower Margin of this Page and Mail

In answering any advertisement on this page it is desirable that you mention THE RAILROAD AND CURRENT MECHANICS.



THIS 17 JEWEL ELGIN IN 25 YEAR GOLD CASE ONLY $12.75

30 DAYS FREE TRIAL

Now—during this Special Sale—is a splendid time to buy a fine Watch. We would like to send you this 17-Jewel Elgin in hand engraved 25-year gold case for your inspection. It sells regularly at $25.00. We save you nearly one half. If you answer this advertisement you can buy it for $12.75.

NO MONEY DOWN

We don't want you to send us one cent. Not a penny. Merely give us your name and address that we may send you the watch postpaid. When it arrives, if you are satisfied that it is the biggest watch bargain you ever saw, pay only $2.00 a month until the price is paid. If not satisfactory, return it at our expense and we will refund your money.

$2.00 A MONTH

If you don't want to keep it, send it back at our expense. You run no risk whatever in sending for this watch. You do not buy or pay a cent till you have proved it in every way we claim. We make this offer because we know the Elgin is the best watch made for the money. We ask NO SECURITY, NO INTEREST. No red tape. Just your name and address and a promise to pay. If this offer appeals to you WRITE TODAY for

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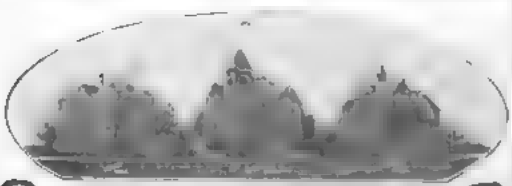

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Just your name and address on coupon below brings you the new 1913 edition of our famous Camp Guide, absolutely free. The most practical book on camp life ever written. Gives you **practical**, [illegible] information for every person who goes camping. **This camp guide tells you everything you need to know about camping**—tells you how to camp comfortably, indicates [illegible] gives you the information that you could not possibly secure anywhere else except by actual and often disagreeable experience.

Get Ready NOW for Your VACATION!

The time for planning is growing short. **Go camping.** You can [illegible] enjoy the way of using [illegible]

But when you do go go right! [illegible] **We sell direct from our huge factories to you** [illegible] **very highest qualities** [illegible] **at less than you would have to pay** [illegible] **for inferior goods.**

Look at these Wonderful Values

This 7x7 ft. Wall Tent, [illegible] the most extreme care

A simply astounding bargain, only $5.90

Family Compartment Tent. [illegible] family or small party **Specially priced at $26.25**

Now Write for our FREE Camp Guide and Catalog

—don't bother with a letter—just your name and address on the attached coupon and we will send the great book you want by return mail. Write today before you go camping. The information you get in this book may save you [illegible] and certainly will get you more real pleasure out of your outing. Remember that it is possible to produce

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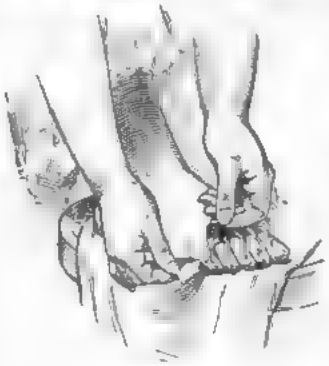

Tell How That Corn Was Ended

You millions whose corns have been ended by Blue-jay—won't you please tell others?

Tell how the pain stopped instantly. Tell how the whole corn, in 48 hours, came out.

You suffered no pain, no discomfort whatever. Tell these facts to others.

For millions of others are still paring corns. Or they still use old-time treatments. And the same corns continue, sometimes for years.

The facts, when we tell them, seem too good to be true. Yet every corn in existence could be ended this week if all folks knew Blue-Jay as you do.

Help us let them know.

A in the picture is the soft B & B wax. It loosens the corn

B stops the pain and keeps the wax from spreading

C wraps around the toe. It is narrowed to be comfortable

D is rubber adhesive to fasten the plaster on.

Blue-jay Corn Plasters

Sold by Druggists—15c and 25c per package
Sample Mailed Free. Also Blue-jay Bunion Plasters

Bauer & Black, Chicago and New York
Makers of Surgical Dressings, etc.

SENT FREE—NO PAYMENT DOWN

ILLINOIS

Best WATCH on Earth NOW SOLD ON CREDIT

For the first time in history the great, genuine *ILLINOIS* Watch is now sold exclusively by mail to you direct. This is the greatest public watch sale ever held. For over 40 years the *ILLINOIS* Watch has been worn and carried the *standard Watch worn by America's great men and women.* No man or woman should now be without a famous *ILLINOIS*

Iron-Clad Guarantee

Part for part in accuracy, wear, finish, beauty, material and workmanship, the *ILLINOIS* is *superior to any other Watch at any price.* *Both the makers and we stand back of this Watch with a guarantee that absolutely protects you.* We are one of the largest Watch Distributors in the world. For over 35 years we have sold all kinds of Watches, and honestly tell you that the *ILLINOIS* is the best at any price.

Take Your Own Time To Pay

NO MONEY DOWN

The famous *ILLINOIS* costs you less than most makers. *Nowhere else can you buy a genuine ILLINOIS on credit.* No matter our guarantee or cost for cash. *Sent on approval* you take no risk. *pay as you please.*

Handsome Book FREE

Our free beautiful, profit-sharing book, describing the *ILLINOIS* Watch, easy credit terms, and reproducing many handsome styles, awaits you. Send name and address today.

Freddro Watch Co., Dept 304, St. Louis, Mo.

Remoh Gems

Look and Wear Like Diamonds

A Marvelous Synthetic Gem
Not Imitation

—the greatest triumph of the electric furnace. *Will cut glass*—stands filing, fire and acid tests like a diamond—guaranteed to contain no glass. Remoh gems have no paste, foil or backing, their brilliancy is guaranteed forever. Only 1/5th the cost of a diamond. These remarkable gems are set only in 14 Karat Solid Gold Mountings.

Sent On Approval Anywhere In U. S.

—your money cheerfully refunded if not perfectly satisfactory. Write for our 4-color De Luxe Art Book, sent free (postage prepaid). Address

Remoh Jewelry Co.,
610 Washington Ave., St. Louis

The Woman in the Case

Consider *her* as well as yourself when buying shirts. *She* doesn't want to be mending all the time and *you* don't want shirts that require it.

Save her time and work—save *yourself* time and *money* by wearing

SIGNAL $1 COAT SHIRTS

Union Made Two detachable collars

Made from tested, fast color, shrinkless percales by specialized union labor; double sewed seams & buttons. Greatest combination of comfort features ever assembled in one shirt includes: Extra button at bottom of breast plait for smooth fit; rip-proof, gap-proof sleeve-slit; specially cut shirts over-lapping 3 inches in front; 2 detached or one attached collar, as desired; buttonholes for white cuffs, double-needle machine stitching; 2 pockets—one a triple combination for pencil, watch and handkerchief.

So much comfort and service were never before put into a shirt even at a higher price.

Sent at Our Risk. Ask your dealer. If he hasn't them, tell us his name and your size and we will express a couple C. O. D. If not delighted with them on examination, return *at our expense*.

Write for folder showing big variety of other styles, and sample swatches.

Hilker-Wiechers Mfg. Co.
Manufacturers of SIGNAL Work Clothes
1252 Mound Ave. Racine, Wisconsin

Send for This Interesting and Instructive Book on TRAVEL

Just Off the Press

It Is Entirely FREE

We expect a greater demand for this 40 page, illustrated booklet on travel, than has ever been known for any other ever published for **free** distribution.

Mothersill's Travel Book tells you what to take on a trip, how to pack and how to carry, information as to check[illegible] Mothersill's Seasick Remedy [illegible] bring it. Please address our Detroit office for this booklet.

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443 Henry Smith Bldg., Detroit, Mich.
Also at 19 St. Bride Street, London, England.
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Shipped Free

Yes, shipped to you on your simple request **without a penny down!** Your choice of any of the genuine Lachnite Gems. The most perfect substitute for diamonds. Brilliant as the most perfectly cut diamond **and will keep so.** Imported from France and cut by the world-renowned diamond cutters of Europe. Yours without sending us a penny. **Put it alongside a genuine diamond** If you can tell the difference, send it back at our expense.

Easy Payments

See the gem first. Then when you decide to keep it, send us only a very small deposit. Take your time about paying for the rest. Your credit is good.

Rock Bottom Prices

Nobody on earth can buy a genuine Lachnite [illegible] cheaper than you. You deal direct with us. Largest [illegible] in the world. [illegible] Send today for the free book that tells all about it.

Write Today for Free Book

Just your name and address on a letter or a post card [illegible] will send you [illegible] free and prepaid, our new book that tells you all about the superb Lachnite Gems. Any of them shipped to you on this great startling offer, with a penny in your own hand and on easy payments. Absolutely no obligations of any kind. It's free if you write at once.

Harold Lachman Co. **Dept. 119Y**
12 North Michigan Avenue, Chicago, Illinois

In answering this advertisement it is desirable that you mention THE RAILROAD AND CURRENT MECHANICS.

The Railroad and Current Mechanics Agents' Bureau

A Department of Opportunity Where the Manufacturer Meets the Men Who Sell His Goods

ADDRESS ALL INQUIRIES FOR RATES AND ENROLLMENTS TO THIS MAGAZINE, 175 FIFTH AVE., NEW YORK

A Little Talk to Agents

There is no time in the year that presents so many opportunities to agents as the spring and summer months.

House cleaning always reveals a thousand and one little things that the housewife needs, and the man who happens around when this necessity is uppermost makes a quick sale.

Why not take a little "flier" into salesmanship this summer? The experience will cost you nothing, the work in the out-of-doors will be beneficial and your financial returns will depend entirely upon your ability to sell merchandise.

Do not get the mistaken idea that house-to-house selling is anything but a clean-cut, honorable pursuit. Many big manufacturers depend upon these keen, alert salesman to take care of a large share of their output, and in many sections of the country the district salesman is an institution on which many homes rely for their knowledge of new time and labor saving novelties and merchandise of every character.

Then, in the summer time, there's the minute picture machines—always profitable, interesting and fascinating. More of them will be in operation this year than ever before.

Let us show you how to break into this big field. Tear off and sign this coupon, and we'll do the rest.

COUPON

1913.

THE FRANK A. MUNSEY COMPANY
175 Fifth Ave., New York.

I agree to be considered as a member of
The Railroad and Current Mechanics Agents' Bureau
with the understanding that this costs me absolutely nothing—that I pay no fees, or make no charges whatsoever.

I am interested in .....

Name .....

Street .....

Above interest of mine I will fulfill you can tell me ..... City and State .....

"In Business For Yourself"

A Booklet Every Ambitious Man and Woman Ought To Read

We want to send it to hustlers, who have the salesman's instinct and can see a profitable business ahead in selling our popular line of

Underwear—Hosiery—Sweaters

Direct to Wearer

We allow representatives a good commission and protect [illegible] guarantee. Repeat orders come [illegible] easy to make everywhere. One of [illegible] the trade [illegible]

R. & S. SUPPLY COMPANY, 151 Catharine Street, Utica, N. Y.

AGENTS Sell what people want and make easy money.

Every pen guaranteed. Retail $1.00. Big profit for you. Write to-day. "Vulcan" Ink Pencils make writing a pleasure

C. J. ULLRICH & CO.
27 THAMES ST., NEW YORK

Here's One of Our Leaders

Sample post paid 25c

A combination automatic garment with canvas supporting straps and other unique features that make it sell on sight. Ten other first-class canvassing propositions for both men and women. Write for particulars.

SANITO CO.
400 Cutler Bldg. Rochester, N. Y.

Protecto Ovenette

For Oil, Gas, Coal or Wood Stoves

Patented. Newest. Quickest. Oven on the market. Lined Steel. Bakes everything perfectly.

NEVER SCORCHES—NEVER BURNS

No worry, no care. Big money assured. Exclusive territory. Write to-day for full [illegible]

J. F. CONNOLLY, Inc., 123 Liberty St., New York

This Man Makes $75 a Week

[illegible] does everybody else. He gets a lot of fun out of life, sees pretty [illegible] and makes [illegible]

Making Big Money Making ONE MINUTE PHOTOS

We set him up in business and [illegible] outfit of [illegible] no rent to [illegible] crowds gather [illegible] 500 per cent profit at once. Write [illegible] a catalogue and show you how.

NATIONAL PHOTOGRAPH MACHINE CO.
Dept. 426, 85 Beaver St., New York City
Established 1890

The Railroad and Current Mechanics Agents' Bureau

We Need a Hustling District Manager in Every Open Territory

We want the [illegible] who [illegible] ...OVER [illegible] sales per day, [illegible] per week. [illegible]

Prof. Hirsch's Famous Rat and Other Vermin Exterminators

[illegible] bottles [illegible] guaranteed and we have hundreds of [illegible] results we obtain.

Our Agents All Make Money Write to us at once, giving your qualifications and in return we will [illegible] for particulars of our [illegible]

PROF. HIRSCH CHEMICAL CO. (Inc.), 28 Elm St., New York

AGENTS

Here's what they all want. Sell **"Ambrew" Concentrated Extract for Making Beer at Home.**

Strictly legitimate. Enormous demand; sells fast; coins you money. Small, compact; carry in your pocket. Territory going fast. No experience required. All or spare time. The season is on; get ready for the warm weather—the big thirst. If $50 a week or more looks good to you send postal today.

THE AMBREW COMPANY, Dept. 1958, Cincinnati, O.

$7.50 Up $29.50 in Two Days

is what Mr. [illegible] made with the DIAMOND POST CARD OUTFIT. Takes [illegible] Photos on Cards. [illegible] Big Profits with [illegible] Plates or Films. No [illegible] Experience necessary. Big profits on every dime. [illegible] Mr. [illegible] says: "I earned $2 operating my Outfit one hour. Hundreds of similar reports from Outfit users."

International Metal & Ferrotype Company,
Dept. B51, No. 2323, W. 19th St., Chicago, Illinois.

Agents Wanted to Sell Necklaces

GOLD new style strings of sweet-scented [illegible] beads in the pearl luster, [illegible] Black Stone, Gray Pearl, Blue, Brown, Violet, Rose, [illegible] with metal beads of same or gold color. 60 inches, $2.50; 48 inches, $2.00; 36 inches, $1.50.

Shumway Bead Co., Kirkland, Wash.

AGENTS wanted for this wonderful SELF HEATING IRON; over 250,000 satisfied users; guaranteed and warranted, dandy seller. Catalog and new selling plan to bona fide agents. G. H. Schubert, Mfrs. Distr., Dept. 34, 3214 S. Halsted Street, Chicago.

AGENTS. A Set of Rogers A-No. 1 Silverware of 26 pieces [illegible] Sprash Water Filters. Price of [illegible] $2 [illegible] Pampers $4.50 per gross. [illegible] $6.00 per gross. [illegible] Percolators $8.00 per gross. Send for catalogue.

N. E. Inc. Light Co., 262 Tremont St., Boston, Mass.

Every 2-Minute Demonstration

sells a 25-cent bottle of **Simplex Cleaning and Polishing Compound,** without grease or unpleasant odor. Agents gain time and reap profits in handling this quick seller. Every woman wants a bottle in her house. It is invaluable wherever there's a scratched or marred piece of furniture. Great for automobiles. Send 4 cents, stamps. Free sample and territory.

SIMPLEX MFG. CO., 175-177 Columbus Ave., New York.

Ruby FREE—

To introduce our Genuine Maztec Gem (U. S. Letters Patent) the only satisfactory substitute for the [illegible] Ruby and [illegible] We make this special offer [illegible] We want [illegible] Write today.

FRANCIS E. FULLER CO. Dept. M.L.G. Mesilla Park, N. Mex.

Send for a Complete Catalogue of

MASONIC BOOKS Jewelry and Goods

REDDING & CO.

Publishers and Manufacturers

Dept. RR, 200 Fifth Avenue, New York

DIAMONDS ON CREDIT

20% DOWN 10% MONTHLY

Save [illegible] our diamonds by [illegible] new [illegible] plan and [illegible] of the [illegible] Legions of [illegible] are [illegible] We [illegible] and [illegible] and [illegible]

L. W. SWEET & CO. 2 & 4 Maiden Lane, New York.

In [illegible] ads are [illegible] on this page it is desirable that you [illegible] THE RAILROAD AND CURRENT MECHANICS

"As Full of Information As an Egg Is of Meat"

We have a limited number—a very few, indeed—of bound copies of the celebrated Volume I of THE SCRAP BOOK. In many respects it is one of the most remarkable volumes ever issued, and once it has passed out of print the miscellanies contained in this book will in all probability never be issued a second time between covers. There is hardly a reference that arises in ordinary conversation that is not discussed in THE SCRAP BOOK.

$1.00

560 pages. Large, easily-read print on good book-paper. The volume measures 7x10 inches and is 1¾ inches thick. It is bound in dark green ribbed cloth and stamped in gold a piece of book-making worthy of being placed side by side with the gems of all literature.

Who wrote "The Akhoond of Swat?"—What are the words of "Casey at the Bat?" What kind of love-letters did Napoleon, Bismarck, Cromwell, write?—What is the famous oration Robert Ingersoll spoke on the tomb of Napoleon?—What men of genius have been mismated?—Who wrote "The Little Church 'Round the Corner," and under what circumstances?—What was Lord Byron's famous riddle?—What were "good manners" fifty years ago?—ask yourself these and hundreds of other questions. Can you answer them? THE SCRAP BOOK can—a knowledge of what it contains will give you a range of information obtainable otherwise only through years of reading and study.

The Volume Prepaid—$1.00

Send us a dollar—stamps, check or money order—and this valuable book will be sent you, charges prepaid.

The Frank A. Munsey Company
175 Fifth Avenue, New York City

What Mr. Munsey Said About this Magazine:

"There isn't anything in the world just like THE SCRAP BOOK nothing, in fact, that compares with it at all ... We have bought hundreds and hundreds of scrap books from all over the country, some of them a century old.... From these books we gathered an enormous number of gems, and facts and figures, and historical and personal bits that are of rare value.... Everything that appeals to the human brain and heart comes within the scope of this magazine."

Frank A. Munsey

DIAMONDS ON CREDIT

SAVE

One-Third to One-Half

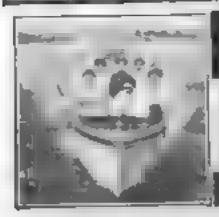
Special selection Diamond Set Jewelry LaVallieres Rings Ear Screws Stick Pins, Cuff Links and Stud Mountings are 14 solid gold except N-51, N-60, N-61 and N-62, which are platinum. Fine brilliant white diamonds The bonds some pieces on our usual liberal CREDIT TERMS: One-fifth down balance divided into 8 equal amounts, payable monthly. Send for Free Jewelry Catalog, explaining our Easy Credit Plan. Any article sent for your examination, charges prepaid We want you to see for yourself that you can save money by sending to us when in need of a Diamond, Watch, etc.

LOFTIS BROS. & CO., Diamond Cutters

Dept. B 849, 108 N. State St.

CHICAGO, ILL.

Branches Pittsburgh, Pa. and St. Louis, Mo.



MULLINS STEEL BOATS CAN'T SINK

THE W. H. MULLINS CO. World's Largest Boat Builders, 324 Franklin St., Salem, Ohio

STEEL ROW BOATS AND CEDAR CANOES

WORK FOR UNCLE SAM

Government positions offer pleasant work good pay Common School Education Many Post Office Railway Mail Clerk Customs Internal Revenue Departmental Clerkships and other positions open to men and women Examinations everywhere soon Many vacancies Preference to ex-soldiers and sailors Write immediately for Booklet 1 PATTERSON CIVIL SERVICE SCHOOL, 707 Livingston Bldg Rochester, N. Y.

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PRICES $15.00 UP First class Machines Full Guarantee. Write for Illustrated Catalog & Our Opportunity.

TYPEWRITER EMPORIUM Est. 1892 34-36 W. Lake St., Chicago

200 Kinds Iron Wood Wire & Nut Puzzles

Sample with Catalog 10c 3 for 25c 7 for 50c 15 for $1. No two alike.

WESTERN PUZZLE WORKS

Station R. St. Paul, Minn.

PARISIAN GEMS FLASH like DIAMONDS

A REAL GEM. For Use and Adornment. The most remarkable imitation diamond ever produced defying detection even by experts Stand acid and fire tests Have many times greater brilliancy than genuine diamonds Cut by experts Mounted in latest style settings Guaranteed for years Sent to any address on earth

SENT ON APPROVAL SEE THEM BEFORE PAYING We will send mounted gems at

PARISIAN GEM CO. Dept. 821 Broadway, New York

Don't Work in the Dark!

Danger lurks in dark places, and every railroader ought to carry a Baldwin —especially fitted for engineers, trackmen, trainmen, baggage handlers, station agents, freight crews, etc

It is the only clear white penetrating light adaptable to railroad use. The

Baldwin Camp Lamp

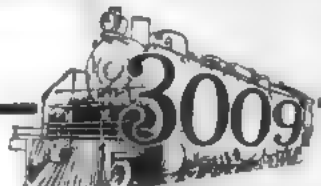
A powerful light inches high, weighs hung or stood upon Don't burn out absolutely safe Nothing like it for a Brass, $1.00 higher on baked nickel with hanged handles, $2.00.

JOHN SIMMONS CO.

29 Frank'n Street, New York City

35 St. Nicholas Street, Montreal, Canada

258 Hansford Block, San Francisco, Cal.

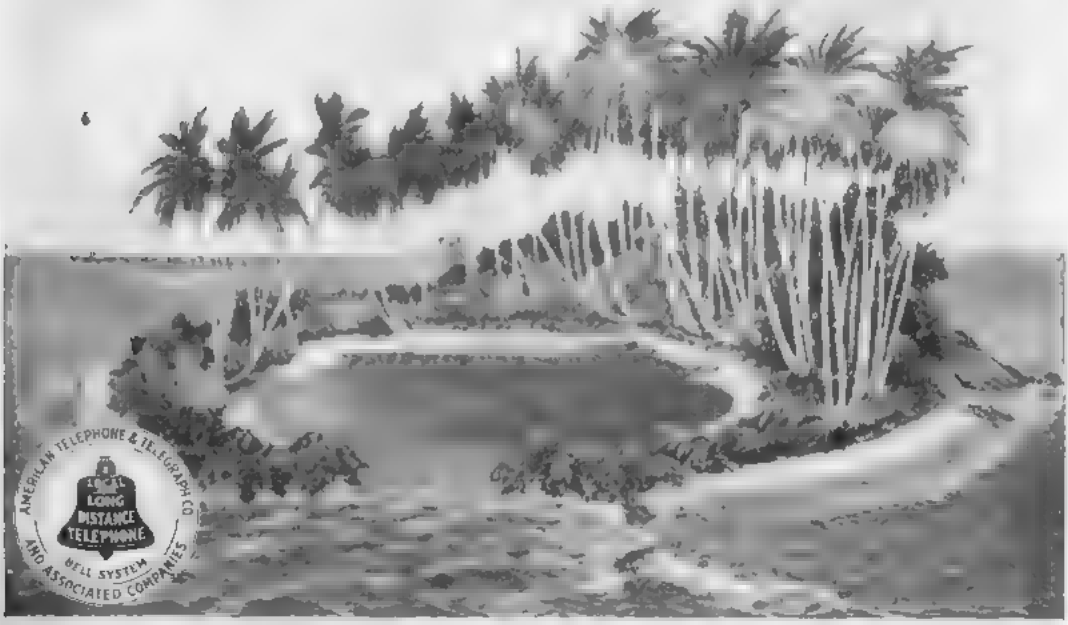


Do You Want a Photograph of the Largest Locomotive in the World?

I have succeeded in taking a good photograph of Santa Fe No. 3009, the largest locomotive in the world. Owing to the difficulties I had to get this photo it is somewhat unique. I will send a copy of this photograph postpaid for $2.00.

R. H. RICE, Needles, Calif.

In answering any advertisement on this page it will be desirable that you mention THE RAILROAD AND CURRENT MECHANICS



Coral Builders and the Bell System

In the depths of tropical seas the coral polyps are at work. They are nourished by the ocean, and they grow and multiply because they cannot help it.

Finally a coral island emerges from the ocean. It collects sand and seeds, until it becomes a fit home for birds, beasts and men.

In the same way the telephone system has grown, gradually at first, but steadily and irresistibly. It could not stop growing. To stop would mean disaster.

The Bell System, starting with a few scattered exchanges, was carried forward by an increasing public demand.

Each new connection disclosed a need for other new connections, and millions of dollars had to be poured into the business to provide the 7,500,000 telephones now connected.

And the end is not yet, for the growth of the Bell System is still irresistible, because the needs of the people will not be satisfied except by universal communication. The system is large because the country is large.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

One Policy *One System* *Universal Service*

MEXICAN DIAMONDS

LOOK and WEAR LIKE REAL DIAMONDS, yet COST 1-20th the Price

Do not deny yourself the most beautiful of all gems when you can buy genuine Mexican Diamonds. Not imitations—but the equal of the finest South African gem when worn **side by side.** Stand all tests; perfectly cut and polished. Their dazzling **blue-white** brilliancy is **guaranteed for life.** Set only in solid gold mountings. Ladies' Tiffany Ring (like cut) with ½ carat gem, **price $8.50.**

Special to introduce Only $4.98

Gents' heavy Belcher ring with 1 carat gem, **price $15**—special for **$11.36.** Either ring sent for free examination on receipt of 50c deposit. State size. *Write today for free illustrated catalog.*

MEXICAN DIAMOND IMP. CO., Dept. ER7, Las Cruces, N. M.

Exclusive controllers of the Mexican Diamond

RANGER BICYCLES

Have imported roller chains, sprockets and pedals; New Departure Coaster Brakes and Hubs; Puncture Proof Tires; highest grade equipment and many advanced features possessed by no other wheels. *Guaranteed 5 yrs.*

FACTORY PRICES direct to you are less than others ask for cheap wheels. Other reliable models from $12 up. A few good second-hand machines $3 to $8.

10 DAYS' FREE TRIAL. We ship on approval, *freight prepaid,* anywhere in U.S., *without a cent in advance.* DO NOT BUY a bicycle or a pair of tires from anyone at *any price* until you get our big new catalog and *special prices* and *a marvelous new offer.* A postal brings everything. *Write it now.* TIRES, Coaster-Brake Rear Wheels, lamps, parts, sundries, *half usual prices.*

Rider Agents everywhere are coining money selling our bicycles, tires and sundries. **Write today.**

MEAD CYCLE CO., Dept. N 35 CHICAGO

Learn How Aeroplanes Fly

Build a Model Aeroplane, then fly it. You can do it if you use "IDEAL" Plans and Drawings. They are accurate and have clear, concise building instructions.

PRICES: CURTISS 3 ft. FLYING BOAT 25c—NIEUPORT 3 ft. Monoplane 25c—BLERIOT 3 ft. Monoplane 15c—WRIGHT 3 ft. Biplane 25c—CURTISS Convertible Hydroaeroplane 35c—"CECIL PEOLI" Champion Racer 25c—Complete set of six, $1.25 postpaid. 40 pp. "IDEAL" Model Aeroplane Supply Catalog, 5c.

Ideal Aeroplane Co., 84 West Broadway New York

The Efficiency of The Railroad and Current Mechanics to Advertisers Is Increased with This Issue

THE RAILROAD MAN'S MAGAZINE has always enjoyed a high reputation as a "producer" for advertisers.

The degree of confidence which it inspires among its readers insures the advertiser a clientele the loyalty of which is beyond question.

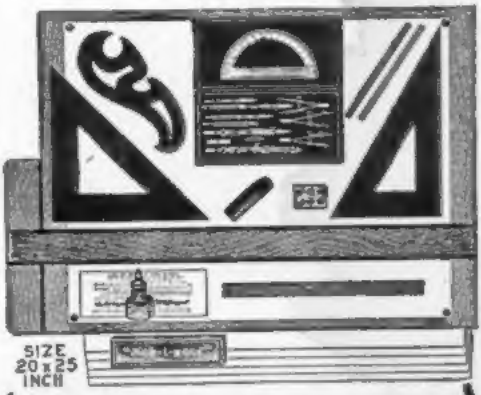
With the addition this month of the "Current Mechanics" feature, the efficiency of the magazine is increased many fold, especially in its value to the advertiser who aims to reach a highly specialized reading public.

The reader who is interested in mechanics, the man with an inventive turn of mind, is a good prospect for any advertiser a buyer of advertised goods, a believer in new things and in doing things in new ways.

Try out THE RAILROAD AND CURRENT MECHANICS next month. If you are after agents, try the AGENTS' HORMAU. It is a steady, persistent "puller."

Rates will be sent upon request—or a representative will call.

THE FRANK A. MUNSEY COMPANY
175 Fifth Avenue, New York



SIZE 20 x 25 INCH

FREE

$15 Drawing Outfit

But you must write at once. Offer expires in 30 days. I make this most exceptional great offer only to a limited number of selected students.—Just think of it! A complete, regular Draftsman's $15 Working Outfit with high grade Imported German Silver Set of Instruments—all free.

Be a Draftsman!

Draw $125 to $175 per month at once

Big demand for skilled draftsmen. Calls every day for men to fill positions paying from $125.00 to $175.00 per month. Many positions paying $75 to $100 per week always open. Work is light, pleasant and profitable. Unlimited opportunities for expert draftsmen and designers. Mail coupon for valuable book, "Successful Drafting." It explains how you can become a skilled draftsman in a short time. It's free.

Chief Draftsman will instruct you personally

I am **Chief Draftsman** of a large and well known company. I will instruct you **personally**—give you just the kind of training you need to enable you to get one of the big jobs. At this time I can accommodate a few more men. If you write me **at once** I will send you my book, "Successful Drafting," with full particulars—**all free.** But you must write to me—or send coupon now.

I Guarantee

To instruct you until competent and placed in a position at a regular salary, paying from $125.00 to $175.00 per month and furnish you free $15 Working Outfit at once.

Earn While Learning

You can start as soon as you enroll, making $5 to $10 per day, working for me at home. **Write today.**

Mail Free Coupon Now

I will send my new book "Successful Draftsmanship" if you write at once, absolutely free—also particulars about my offer to a few ambitious men who want to make from $2,500 to $5,000 a year. No obligations whatever on you in sending the coupon.

FREE Outfit Coupon

Chief Draftsman: Engineer's Equipment Co., Div. 110Y Chicago, Ill.

Without any obligation on me, please mail your book "Successful Draftsmanship" and full particulars of your liberal "Personal Instruction" offer to a few students. It is understood that I am obligated in no way whatever.

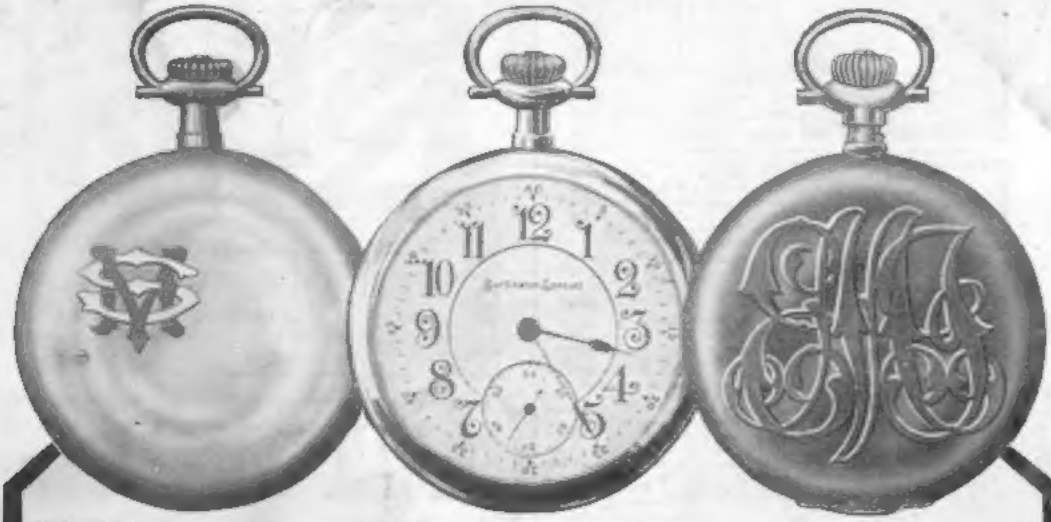
Chief Draftsman
Division 110Y
Engineer's Equipment Co. (Inc.)
CHICAGO ILL.

Name .....

Address .....

.....

RH



The 1913 Timepiece

The superb 19-Jewel Burlington Special with the latest improvements in watch manufacture, perfect adjustment to position, the absolute adjustment to isochronism, besides temperature adjustment. Also the newest style Montgomery dial and the magnificent inlay enamel cases in many colors. A watch perfect in every detail and beautiful in design. Clip the coupon below and send for the superb Burlington watch book explaining a *remarkable* offer.

The Burlington watch book fully illustrates the points of a truly ADJUSTED timepiece; it also shows all the very latest designs in watch cases for you to choose from. Inlay enamel cases, ribbon monograms, block monograms, diamond set cases, dragon designs, French art designs, etc. All sizes, ladies' and men's. Take your pick of any of them on this startling offer.

Sent Without a Penny Down

Yes—we want you to see and examine the watch in every particular before you decide (returnable at our expense).

$2.50 a Month!

If you decide to keep the watch, you may pay for it on the easiest kind of payments. Only $2.50 a month, at the rock bottom price, for the world's greatest watch.

The Rock Bottom Price

If after examination you decide to keep the superb Burlington Special Watch, you may have it at the direct price—the rock bottom price, absolutely the *same* price that *even the wholesale jeweler must pay.*

We Do Not Care What It Costs

We have *decided* upon this direct offer—selling the public direct at the *same* price that even the wholesale jeweler must pay—in *defiance* of the *contract* systems—we are in this fight to *win*—and so the public gets the benefit of our wonderfully *special* offer.

FREE

Book Coupon

BURLINGTON WATCH CO.
Dept. 110Y, 19th and Marshall Blvd.,
CHICAGO, - ILLINOIS

Please send me (without obligation prepaid) your free book on watches and copy of your $1,000 challenge, with explanation of your cash, or $2.50 a month, offer on the Burlington Watch.

Name.....

Address.....

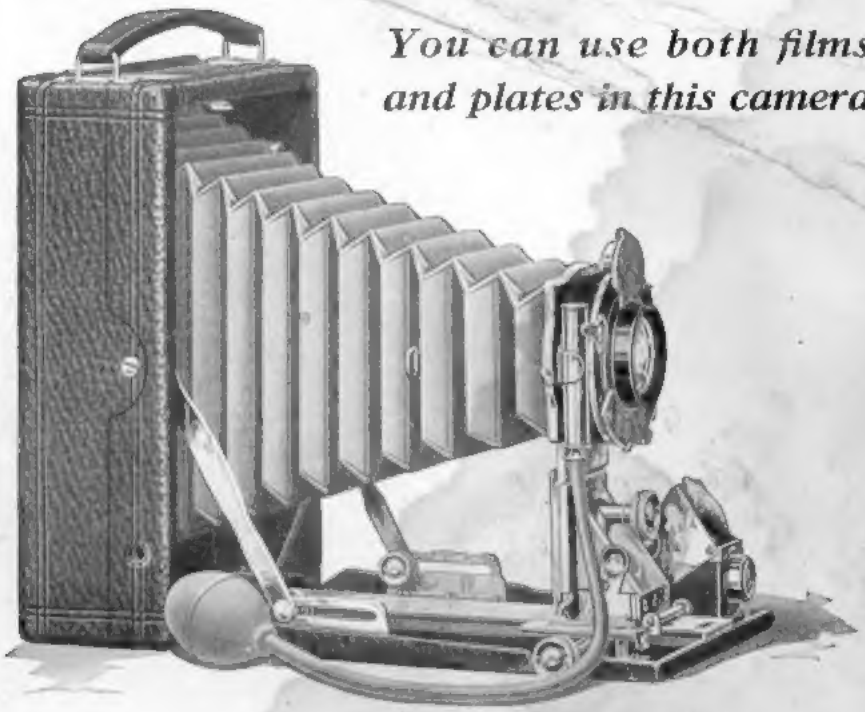
.....

Mail Coupon for Free Watch Book

Just put your name and address on the coupon and send it to us. Even if you do not intend buying a watch just now, you should have this book. You should know the inside *facts* about this watch business, the secrets about prices and contracts which this book contains. Post yourself, no obligations. So write today for this superb catalogue of 1913 watches.

BURLINGTON WATCH CO.
Dept. 110Y, 19th and Marshall Blvd., CHICAGO, ILL.

You can use both films and plates in this camera



PREMOS

Solve at once the question for those who are undecided as to whether to purchase a film camera or a plate camera.

They take films or plates with equal facility, and offer the important advantage of ground glass focusing and tank development with either.

For plates, merely use an ordinary plate holder—for films, use the Premo Film Pack Adapter, which goes into the camera, just like the holder, and offers the further advantage of loading 12-exposure film packs in broad daylight.

And these cameras are as compact, fully as easy to operate, as the ordinary camera taking either films or plates exclusively.

They are equally suitable for vacation and all-the-year-around use.

The illustration shows the Filmplate Premo, a camera of very great efficiency, made in four sizes—$3\frac{1}{4} \times 4\frac{1}{4}$, $22.50; 3A ($3\frac{1}{4} \times 5\frac{1}{2}$) $25.00; 4 x 5, $25.00; 5 x 7, $30.00.

Another model is the Pocket Premo C, a very popular one for its low cost, in a camera having its exceptional advantages. Two sizes—$3\frac{1}{4} \times 4\frac{1}{4}$, $12.00; 3A ($3\frac{1}{4} \times 5\frac{1}{2}$), $15.00.

The new Premo catalogue describes these and many other Premos, as well as the Premo Film Pack and tank developing system. Free at the dealer's, or postpaid to any address on request.

Rochester Optical Division, Eastman Kodak Co., **Rochester, N. Y.**

Fresh Air and Natural Food

The most "natural" foods are the cereals.

These should be cooked at the factory in a clean and scientific manner to make them easily digestible.

Grape=Nuts

FOOD

Is made of wheat and barley, the greatest of all cereals, containing the tissue-building (proteids), energy-making (carbohydrates) elements; and *also* the "vital" phosphates (grown in the grains) which Nature requires for replacing the soft gray material of brain and nerve centres, worn away by Life's daily activities.

Follow the law of Old Mother Nature—eat Grape-Nuts and cream, and *give it to the children*, at least once a day.

"There's a Reason"

THE MUNSEY PRESS, NEW YORK.